

# FOOD PROCUREMENT BY USDA's FARM SERVICE AGENCY

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## Abstract

USDA's Farm Service Agency (FSA) purchases food products for distribution through several of the Department's food assistance programs. This report describes FSA purchase methods and compares them to procurement strategies used by other Federal agencies and by private sector firms. It summarizes the principal policy issues faced by FSA in designing procurement strategies. Finally, it uses a detailed statistical analysis to compare FSA prices to those realized in the private sector, and to identify the separate effects of agricultural commodity prices, seasonality, client location, purchase volumes, product characteristics, and competition on FSA product prices.

Keywords: procurement, auctions, food assistance, competition

This report was prepared by James M. MacDonald [202-694-5391], Charles R. Handy [202-694-5385], and Gerald E. Plato [202-694-5383]

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# EXECUTIVE SUMMARY

The U.S. Department of Agriculture's Farm Service Agency (FSA) purchases food products for distribution through several of the Department's food assistance programs. FSA purchases food throughout the year, using methods that economists refer to as auctions. The food products are then delivered to States for distribution to client agencies, such as school systems and social service organizations, which in turn distribute the products to needy households.

In the fall of 1996, FSA asked the Department's Economic Research Service (ERS) to evaluate the agency's procurement system. This report summarizes that work, based on three sources of information: 1) interviews with participants, including FSA employees and clients, other government agencies with responsibilities for food procurement, and private sector food processors and distributors; 2) summary FSA expenditure and quantity data; and 3) an extensive statistical analysis of data on individual FSA auctions, focusing on the determinants of FSA bid prices and on comparisons with commercial prices for the same products.

## **FSA Obtains Highly Competitive Prices**

FSA's system aims to elicit low-price bids for the delivery of large volumes of a limited number of food products. The system works well in reaching those goals: FSA prices are substantially lower than those paid by private sector buyers for corresponding products. Moreover, processing margins for FSA products are quite low; FSA stretches USDA budget dollars by purchasing substantial volumes of food products for any given budget allocation.

Experience at other major Federal procurement agencies, such as the Department of Defense and the Department of Veterans Affairs, shows that ultimate consumers want more than low prices. Along with nutrition, they are also interested in timely delivery and product variety. FSA does not act as a full-line food distributor for its clients, and hence does not focus on wide variety and rapid delivery. Rather, it provides clients with the opportunity to obtain large volumes of a few items at very favorable prices, by limiting product variety and by responding more slowly to orders than full-line distributors. Clients can more effectively spend the rest of their budgets on a variety of products.

## **But Clients Cite Four Problems in USDA Service Quality**

1. ***Unreliable Delivery.*** Because of FSA's long lead times for delivery, client agencies must plan meals well in advance. If deliveries arrive late, meal plans are upset, meal quality can suffer, and client agency costs can rise sharply when they must replace FSA's orders quickly. Interviewees cited several sources of delivery delays: lags due to USDA inspection delays (typically at small plants), cancellation of auctions, and vendor noncompliance.

2. **Product Selection.** Client agencies feel that surplus removal goals often drive the selection and distribution of bonus commodities that clients frequently have little interest in, although this problem relates more to the distribution of bonus commodities through the Agricultural Marketing Service.

3. **Product Deterioration.** USDA products follow a long distribution chain between ordering and eating. A client first places an order with USDA, which arranges for production. A vendor then manufactures the product, and arranges for delivery from the processing plant to a State warehouse or to another processing site. The product is then delivered to the client's central facilities, before being distributed to dining facilities, where further preparation and holding may occur before serving. Deterioration may occur at any point in the chain.

4. **Problem resolution.** The client may interact with State government agencies in ordering and final delivery, and may be unaware that up to five different USDA agencies may be involved in their order for food, as well as private vendors, truckers, and warehouses.

## **What Drives FSA Bids? Observations and Recommendations**

1. **Agricultural Commodity Prices.** FSA bids are far more sensitive to agricultural price movements than are wholesale and retail food prices. Because FSA prices are so sensitive to agricultural prices, they will fall more than wholesale and retail prices when agricultural prices decline, and they will rise more when agricultural prices rise. The gap between FSA and corresponding retail and wholesale prices should therefore be largest during periods of relatively low agricultural prices, and smallest during periods of high agricultural prices.

2. **Competition.** We found that competition matters in FSA auctions, but it matters a lot only in some circumstances. As an approximate rule of thumb, FSA can do as much for its clients by attracting a second bidder to a monopoly auction (reducing prices by 4-7 percent), as by finding four more bidders for an auction that already has two. Consequently, we recommend that FSA focus its efforts on adding bidders at those auctions that typically attract only 1 or 2 bidders.

The number of bidders in FSA auctions varies substantially by product and over time. Where are the most serious competitive problems? The data suggest that seasonality is important for some products: for example, over three-quarters of monopoly auctions in flour occur in the fall, when mills operate near peak capacity. Monopoly auctions are also more likely among products with limited FSA volume, because of unusual package sizes or product characteristics.

In those cases, FSA can counteract monopoly by conveying accurate price information to clients—for example, that FSA's price advantages over commercial flour providers are weakest in the fall and strongest in other periods, or that FSA's price advantages are strongest in high-volume products. We recommend that FSA explore ways to counteract seasonal variations in monopoly by extending the experiment with rolling contracts, currently in use with cheese, to other products.

Participation in FSA bidding has a distinctive “all or nothing” character to it—bidders typically commit to being active in FSA auctions, in which case they bid actively each month on auctions for a variety of locations and products. Auction participation then does not typically decline because bidders reduce the number of auctions they are active in; rather, firms decide to get out of FSA bidding entirely. Our present research has not aimed to uncover the reasons why firms decide to enter or leave FSA’s bidding process. But efforts to increase competition should emphasize research into the reasons for entry and exit by those firms, and the research should generate strategies to attract participation by more firms.

3. **Product Volumes.** Monthly FSA purchase volumes have dropped substantially as a result of changes in USDA commodity support programs. But declining volumes have not yet had any substantive effects on FSA prices. Purchase volumes have only small direct effects on prices, and those effects are not always in the same direction. Moreover, the monthly volumes that matter are total USDA purchases (foreign and domestic), and not simply domestic purchases. The most important effects on prices occur in months in which large PL480 purchases are occurring—in those months, coincident large domestic purchases can lead to FSA price increases of 2-4 percent. The driving factor in these instances are PL480 purchases, which vary quite sharply from month to month. FSA should initiate strategies to get better prices on domestic flour and vegetable oil, either by smoothing PL480 purchases, or by timing domestic purchases to avoid peaks in PL480 purchases.

Order volumes (the amount going to a specific destination in a specific order) have very small effects on prices. Larger orders generally draw more aggressive bidding, but prices only fall by less than 1 percent—combining orders into multiple truckloads yields very limited savings. Major gains in price likely come as one goes to truckload volumes from smaller orders, and FSA already acts to combine small orders into orders of at least truckload sizes.

## **Service Quality Observations and Recommendations**

FSA’s procurement system is designed to obtain good-quality products at very competitive prices. But at times, FSA may sacrifice service quality in the form of reliable delivery and in the pursuit of advantageous prices:

1. **Cancelled Auctions.** There may be a problem in Kansas City Commodity Office’s (KCCO) calculation of constructed prices, used in deciding whether to cancel an auction and shift purchases to a later month. In particular, because constructed prices seem to be less sensitive to underlying agricultural prices than actual bid prices are, constructed prices may give insufficient weight to agricultural prices. Now, the threat of cancellation can be useful— auction theory suggests that the threat can lead to more competitive bidding, and the threat of cancellation is only credible if it is actually used at times. But actual cancellations lead to lags in product deliveries, and can therefore impose substantial costs on clients. We therefore recommend that FSA review its procedures for calculating constructed prices, with a particular focus on the weight given to agricultural prices.

2. **Penalties.** Vendors have traditionally faced weak penalties for failures to meet FSA delivery dates. Our statistical analysis shows that vendors are very sensitive to

economic incentives—they revise bids quickly to changes in materials costs, transport costs, and capacity utilization. Stronger penalties for noncompliance, in the form of financial penalties or suspension of later contracts, should lead to improved vendor compliance.

**3. *USDA Inspection and Labels.*** Under existing rules, FSA products undergo onsite USDA inspection and must carry USDA, rather than commercial, labels. The rules are related: reliance on USDA labels and packaging shifts some risks of poor product quality to USDA, and consequently creates a need for USDA inspection. Inspection, along with occasional unusual packaging requirements, can raise vendor costs by 1-2 percent; USDA inspection and testing can also lead to lags in product delivery, which clients cite as a persistent problem. Some vendors, especially relatively small plants, cite inspection and packaging requirements as deterrents to participation in FSA auctions, because of the effects on cost and on timely delivery of products.

The current system results in very competitive prices, and the insistence on USDA labels may contribute to the competition that leads to those prices—some firms may not wish to bid aggressively on their own branded products. In some products, in other words, the net effect of USDA labels and inspection may be lower prices. But the insistence on USDA labels may, in other products, limit opportunities to obtain surplus stocks of commercially labeled products and may deter additional bidders from participating.

FSA currently purchases commercially labeled products in a few commodity categories. In markets with only a few vendors, FSA may be able to obtain more product variety and greater competition by opening auctions to commercially labeled products—the clear examples include the current experiments in ready-to-eat cereal and infant formula. Those two cases illustrate a dilemma for the agency. A principal argument made for USDA labels is that they limit brand loyalty on the part of consumers and therefore allow for more competitive bidding, but brand loyalty is important in those two products (especially ready-to-eat cereal).

FSA's shift to purchase of commercial labels reflects the agency's judgment that the shift may introduce greater competition into two highly concentrated markets. But FSA also purchases products for other markets in which brand loyalty is far less important, because the brands are never seen by ultimate consumers and because the products are used as ingredients in final servings, not as the serving itself. We recommend that FSA carefully evaluate its current experiments and consider a gradual expansion of commercial labels (especially including high-quality private label and wholesalers' own-brand products), especially in products with limited existing brand loyalty and low vendor participation.

The research for this report relied primarily on paper reports, whose data were reentered into an electronic format, because FSA disposes of the electronic records of auctions after 1 year. Electronic data retention grows cheaper every year, as do methods for analyzing data. Moreover, because of steady improvements in data retention and analysis, undergraduate business and economics majors now routinely learn almost all of the techniques used in this report. KCCO commodity analysts should in the future be able to easily call up 5 years' worth of past auction data (for example); they should be able to quickly summarize key data patterns, and can easi-

ly be provided with expert summaries of more subtle issues. They should be able to use that information in making auction decisions and in delivering timely information and advice to client agencies. We recommend that KCCO's future strategy for information technology include steps to retain electronic auction records and to develop those records into easily accessible databases.

# CHAPTER 1

## INTRODUCTION

The U.S. Department of Agriculture’s Farm Service Agency (FSA) purchases food products for distribution through several of the Department’s food assistance programs. The products are then delivered to client agencies, such as school systems and social service organizations, which in turn distribute the products to needy households. FSA purchases food products throughout the year, using methods that economists refer to as auctions. An auction is a bidding mechanism that encompasses a set of auction rules, which in turn specify how potential bidders may participate in the auction; how the winner is determined; and how much, in the case of procurement auctions, the winner is to be paid (McAfee and McMillan, 1987; Wolfstetter, 1996). Auctions are widely used in government procurement activities, and are also used to distribute oil drilling and timber harvesting rights on Federal property, and to finance Federal activities through the sale of Treasury bills. In the private sector, auctions are used to sell such products as wine, art, flowers, fish, and tobacco, and to solicit delivery price offers for products ranging from office supplies to tires to construction jobs.

In the fall of 1996, FSA asked the Department’s Economic Research Service (ERS) to evaluate the agency’s system for procuring and distributing food products. This report summarizes that work, and is based on three sources of information. First, ERS researchers conducted a series of interviews with participants in the process, including FSA employees and clients, people at other government agencies with responsibilities for food procurement, and private sector food processors and distributors. Second, we acquired

summary expenditure and quantity data from FSA and from other government agencies. Finally, we developed a large database, using FSA administrative records, on the results of separate procurement auctions and performed extensive statistical analyses of those auctions. We focused particularly on the determinants of bid prices in FSA auctions and compared those prices to commercial prices for the same products.

Chapters 2 through 4 describe the environment within which FSA carries out its procurement activities. We first provide an overview of the largest Federal food procurement agencies. In particular, we describe the differences among USDA, the Department of Defense, and the Department of Veterans Affairs in procurement goals and methods, and describe recent major changes in procurement methods at the latter two Departments. We then detail, in Chapter 3, USDA’s food procurement programs—the agencies and food assistance programs involved, the statutory framework that drives USDA programs, and recent expenditure patterns. Chapter 4 provides a detailed description of the actual steps involved in purchases administered by FSA.

In the fifth chapter, we build on the material introduced earlier, and describe a set of policy issues that relate to FSA procurement. That is, a set of specific rules currently constrains FSA to purchase quite specific products, with customized packaging, and requires an extensive system of onsite inspection of USDA’s food products. We summarize those rules, identify their interlinkages, and discuss potential alternatives.

Moreover, current FSA procedures could be modified in a variety of ways. We discuss potential modifications and their possible effects.

Chapters 6 through 8 rely on the large database of FSA purchase records. We first discuss the construction of the database in chapter 6, and summarize the key price, volume, competition, and product measures in the data. In chapter 7, we report the results of our statistical analysis of bid prices in FSA purchases. We estimate the effects of agricultural commodity prices, product and packaging characteristics, purchase volumes, and competition on bid prices in five FSA commodity categories over a 5-year period. The results should help FSA to identify the major factors behind actual and forecast changes in product prices and to plan for tacti-

cal changes in policies aimed at improving performance.

We use the analyses of chapters 6 and 7 to develop measures of average FSA prices in chapter 8, measured at particular times and locations. The chapter then compares those average prices to commercial price quotes for those products, times, and locations. The data provide evidence of the price advantages that FSA can deliver to its clients, as well as the sources of those advantages; in short, it summarizes FSA's relative strengths and weaknesses in food procurement and distribution. A concluding chapter summarizes our major positive and negative findings, and offers some recommendations for FSA auction strategy.

# CHAPTER 2

## AN OVERVIEW OF FEDERAL FOOD PROCUREMENT PROGRAMS

### Introduction

Several government agencies administer large-scale food procurement programs. At the U.S. Department of Agriculture (USDA), two agencies—the Farm Service Agency (FSA) and the Agricultural Marketing Service (AMS)—purchase food products for domestic distribution on behalf of a third—the Food and Nutrition Service (FNS). Those products are distributed through domestic food assistance programs, such as the National School Lunch Program (NSLP) or The Emergency Food Assistance Program, which are financed by FNS. About three-quarters of the food purchased under domestic food assistance programs is distributed to school districts under the NSLP, while the rest is distributed through a variety of smaller programs, described more fully in chapter 3. The two USDA agencies spent \$849 million on food purchases for domestic programs in 1996.

Food procurement forms a small part (less than 2 percent) of total FNS expenditures on domestic food assistance. Most of the total FNS food assistance budget of \$38 billion goes to support direct cash transfers, such as payments to foodstores for redemption of coupons and vouchers under the Food Stamp and Women, Infants, and Children Programs, or cash payments to schools for subsidized meals under the NSLP. Schools receive about 20 percent of their USDA support in the form of commodities, with the rest in cash support.

FSA also purchases and ships food and agricultural

commodities to foreign countries under the Food for Peace program (PL480) and other international assistance programs. The programs are administered and financed by the State Department's Agency for International Development (AID) or another USDA agency, the Foreign Agricultural Service (FAS), for which FSA acts as the buying agent. FAS expenditures for PL480 programs were \$1.21 billion in 1996. In addition, FAS spent another \$84 million on food expenditures for the Food for Progress program. Under this program, U.S. agricultural commodities are provided to developing countries and emerging democracies that have commitments to introduce and expand free enterprise in their agricultural economies.

At the U.S. Department of Defense (DoD), the Defense Personnel Support Center (DPSC) purchases food for military bases, ships, and other military facilities. DPSC purchases for all four branches of the military, acting as the buying agent for the Defense Logistics Agency (DLA). In addition, DPSC has contracts to act as purchasing agent for the U.S. Coast Guard, some prisons, and some school systems. DPSC food purchases amounted to approximately \$525 million in 1996, and the agency also provided \$115 million in other contract services.

At the Department of Veterans Affairs (VA), the Office of Acquisition and Materials Management (OAMM) purchases food for 173 VA facilities, primarily medical centers. OAMM food expenditures amounted to \$60 million in 1996, along with another \$12 million in food

equipment and supplies. The agency also aims to obtain contracts to act as purchasing agent for other entities; for example, OAMM handles food purchases for medical facilities in the U.S. Army Medical Command.

## Program Goals

Each agency tries to reach several primary and secondary goals through their procurement strategies. For example, the USDA agencies traditionally have had dual goals—surplus removal and food assistance. USDA has historically purchased substantial volumes of agricultural commodities in order to support prices for “program crops,” such as wheat, corn, and dairy products. The Department has then had to find ways to dispose of the accumulated surpluses, and one way has been to distribute them outside of normal commercial channels through food assistance programs to low-income households and countries. Surplus removal, used for Section 32 purchases by AMS, often emphasizes the rapid distribution of large volumes of particular commodities, those that have had large harvests and falling prices, in order to support producer prices. As a result, AMS procurement has generally emphasized agricultural commodities and less processed food products because of their closer link to the farm sector.

Food assistance programs include the distribution of emergency supplies of staple food items to areas hit by such natural disasters as floods, hurricanes, and earthquakes, and the regular distribution of food products to members of low-income households. Assistance goals include the assurance of nutritionally adequate diets among client groups, as well as income support for food assistance recipients. Because most expenditures have been aimed at staple food products that are often storable for extended periods, procurement procedures have emphasized the acquisition of simple, nutritionally sound foods at competitive prices.

DoD and VA purchasing agencies do not operate under surplus removal expectations. Because they provide a substantial share (up to 100 percent, for some) of the food consumed by their clients, they are under greater pressure to provide for product variety, and not simply nutritional adequacy. Moreover, because DoD client food demands may fluctuate sharply (for example, when a ship arrives at a base or when a reserve unit is activated), DPSC—DoD’s procurement agency—must respond rapidly to unexpected service demands. As a result, the agencies’ procurement strategies emphasize

quick delivery of a wide variety of food products.

Food procurement agencies also aim to realize some secondary goals that often are imposed by statute. Each is required to support small businesses by setting aside a certain percentage of purchases for firms that are designated as small businesses. USDA is required to buy foods that use products from American farms, and the Merchant Marine Act requires FSA to arrange for ocean shipment in American ships. VA medical centers are expected to purchase a percentage of food in local areas in order to support local economic development. USDA agencies often attempt to encourage good dietary and purchase habits through example, by offering low-fat versions of food products and by forgoing more expensive commercially branded products.

## Procurement Methods

USDA, DoD, and VA use different procurement methods. Most USDA procurement is done through sealed-bid auctions for the delivery of a limited variety of food commodities to central warehouses or further processors. Client agencies then generally take responsibility for distribution from warehouses, reprocessing some commodities (such as cheese and flour) into more highly processed foods (such as pizza), delivery to points of consumption, and local preparation. By contrast, DoD and VA have recently introduced “prime vendor programs,” in which a private firm (the prime vendor) is responsible for ordering products from processors, providing storage for an inventory of products, and delivering a wide variety of food products to all facilities within a region, with clients then responsible only for their own ordering and for local preparation.

## A Brief Description of USDA Procurement Methods

FNS receives the appropriation for USDA programs; it also allocates funds to the client State and tribal distributing agencies, collects food commodity and product orders from these agencies, and ensures their compliance with program requirements. State and tribal agencies use FNS program guidelines to determine if individuals are eligible to receive food products and to deliver products from warehouses to the targeted population.

Client agencies place orders for food products, working from product lists (with likely price ranges) provided

by FNS. USDA's procurement agencies, FSA and AMS, then aggregate the orders to truckload quantities, and produce invitations for vendors to enter bids to produce the orders. An invitation usually includes multiple auctions, where each auction is for the award of an order for delivery of truckload quantities of a precisely defined food product to a distribution point within a defined time period. The time period is usually a 2-week span, the distribution point is usually a warehouse in reasonable proximity to the client, and food products are defined as to type (say, all-purpose flour or bread flour), package size, and ingredient requirements.

USDA distributes invitations and runs auctions once a month for some products, while auctions for others are held weekly (ground beef), seasonally (some fruit products), or annually (infant formula). Vendors (food processing firms) respond by submitting sealed bids; sealed bids are not known or observed by rivals, as would occur in the sort of open verbal auctions used at art auction houses. Vendors typically do not offer bids on all auctions in an invitation, but frequently enter bids on more than one. A bidder may place a maximum on the total quantity that they would be willing to produce from all the bids entered in an auction, and bidders in some auctions may also place minimum quantities, below which they will accept no awards.

USDA aims to award the order to the best bid in an auction, subject to several constraints. For international shipments, USDA considers ocean transport charges as well as the vendor's quoted prices for delivery of a product to a domestic port—that is, the winner is determined by the lowest total cost to USDA. When low bidders are above their maximum or below their minimum total quantities, agencies will attempt to make awards in ways that will minimize invitation-wide total costs to USDA. Finally, some orders are set aside for small businesses, as long as a qualified small business enters a bid that is within 5 percent of the lowest bid.

Vendors are expected to arrange for transportation to warehouse points or, in the case of international shipments, to ports. Commercial freight forwarders arrange for ocean shipping to international clients, while domestic clients arrange for transportation from warehouses. USDA requires onsite inspection of all products; inspectors for some products are employed by AMS, while another USDA agency, GIPSA (the Grain Inspection, Packers and Stockyards Administration), provides inspectors for other commodities. Laboratory

testing services supplement the onsite inspectors and are supplied by AMS and GIPSA.

## Prime Vendor Programs

USDA's procurement auctions rely on competition among processors to obtain precisely defined food products at favorable prices. Prime vendor programs also rely on competition, but for a different sort of award.

Under the DoD program, the country is divided into regions, and in each region, a single prime vendor supplies military facilities with food products. DoD now has 50 Prime Vendor contracts in the continental United States. Contracts are for a single base year, with provisions for three or four 1-year extensions. The prime vendor is generally not itself a manufacturer; most are foodservice wholesalers. Prime vendors offer distribution facilities and choices from a wide range of food items. They obtain products from processors, assemble loads for clients, and deliver from the prime vendor's warehouses directly to ships, base dining halls, and other locations. Prime vendors also provide a central point of contact for problems with deliveries, product quality, or errors in orders.

Prime vendors in the VA program perform a similar function, but the VA divides the country into 16 regions. The geographically larger VA regions are able to combine hospital purchases into a large enough aggregate to correspond to the business opportunities offered to prime vendors in DoD regions.

Prime vendor contracts are awarded after competitive bidding among potential vendors. The contracts are for indefinite quantities because base food demands are not perfectly predictable far in advance. The DoD procurement agency, DPSC, provides bidders with a list of items wanted, along with estimated quantities and likely minima and maxima; the agency also estimates the likely dollar volume of sales for each region. In response to the invitation, and after pre-proposal conferences, bidders submit very large and extensive proposals. DPSC then evaluates the proposals. It considers a business segment of the proposal, in which it asks for price quotes on a sample of items, as well as the bidder's fee per item. The agency also assembles a technical panel to make site visits and to review the bidder's ordering systems, inventory controls, and delivery technologies.

VA technical panels review the size of bidder warehouses, the variety of products and the capability to add new items, transport options, and purchase and accounting systems. Price quotes are also included for evaluation in the business segment of bidder proposals.

Contract awards are made on the basis of the lowest priced, technically feasible, proposal. DPSC managers expect, however, that the basis for awards will shift somewhat toward best value, which would add considerations of past performance and service quality to the awards decision.

DPSC purchases some military-unique food items, including those with special packaging to withstand shipboard or airborne conditions as well as foods that are prepared for field consumption. DPSC runs competitions to select a single manufacturer for each military-unique item, and handles orders and payment to the manufacturer. Prime vendors then assemble and deliver military-unique items to bases.

DoD and VA procurement agencies do not rely on extensive onsite inspection to provide quality controls as USDA does. Instead, pressures to maintain quality and to meet contractual obligations arise from several sources. First, contracts are renewable, and past performance becomes a factor in competitions for renewed awards. Second, military facilities are not obliged to spend all of their food dollars at prime vendors; they may also purchase from local vendors. Third, mess halls and other dining facilities are not obliged to accept deliveries from prime vendors; they may reject and return unacceptable products. Fourth, the agencies retain the right to audit the relevant records of prime vendors during the course of the contract. Finally, most prime vendor food products are identical to those the vendor supplies to its other commercial clients. Vendors have incentives to maintain and assure the quality of their private-label brands and services; if quality deteriorates, they risk losing not only DoD and VA business, but commercial sales as well.

### **Causes of the Shift to Prime Vendor Programs**

DoD prime vendors supplanted a system of military depots. Prior to the shift to prime vendors in 1995, DPSC ordered food products on behalf of military facilities, much as USDA's agencies now order on behalf of school districts and other clients. Food products were

then delivered to depots operated by the Defense Logistics Agency (DLA), and from there were distributed to base warehouses. Finally, products were delivered to mess halls, ships, and other dining facilities from the base warehouses.

Two problems drove the shift to a prime vendor system. First, aging military depots and warehouses were in need of substantial investments in construction and maintenance. Second, food deliveries required long lead times, 45 days between order and delivery. Prime vendors provide substantially improved service to dining facilities; over 99 percent of orders are delivered within 2 days, if substitution among brands and package sizes is allowed. Vendors operate 7 days a week, and offer a wide variety of products. The military has been able to consolidate depots and warehouses, and to realize substantial savings in the costs of carrying food inventories, which fell from \$230 million prior to initiation of the program to \$69 million in late 1996, with a goal of \$15 million after full implementation.

Of course, the need for warehouse space does not disappear with the introduction of the program—prime vendors now provide services of storage, repackaging, delivery, and administration that the military used to do by itself. DPSC managers estimate that vendor fees for these services amount to 11-12 percent of commodity sales. DPSC receives additional payments equal to 6 percent of total expenditures for prime vendor commodities and services. DPSC provides translation software to enable the different services to order through a consistent computer system, advises facility managers on sound purchasing strategies, handles the flow of payments from bases and DLA through DPSC to the vendors, and administers the system of prime vendor contracts.

Procurement agencies and clients must make some adjustments under prime vendor programs. With a wider range of available products, clients must learn more about the products that are commercially available, and they need to invest in learning about electronic ordering and tracking systems. Agencies assume greater responsibility for advising clients and for reviewing and supervising vendors.

The VA's 1995 shift to a prime vendor program came slightly before DoD's did. Before then, VA purchased about 300 different food items distributed through a depot system. In the view of VA managers, vendor

prices were relatively high, and delivery times through the depot system were poor. Food item distribution costs appear to have been subsidized by pharmaceutical items in the VA depot system. When pharmaceutical procurement was pulled out of the depot system, the food procurement program came under substantial financial pressure, leading to a search for alternatives. In the VA case, managers cite lower product prices, wider variety, more timely delivery, and the elimination of depot facilities, along with their associated expenses, as advantages of the new system. Prime vendor fees average 9-12 percent of food product costs, and the VA's procurement office, the Office of Acquisition and Material Management (OAMM), charges a one-half-percent fee for its services.

The VA provides some volume guarantees to prime vendors by committing at least half of a region's purchases to the prime vendor. Clients may also reduce costs on some items by providing volume commitments on specific products to the manufacturer/vendor from which the prime vendor purchases.

## Conclusions

USDA's procurement programs are designed to obtain a limited variety of precisely defined food products at the lowest possible cost to USDA for delivery to warehouses. As we shall see in later sections, USDA relies on tight specifications and direct inspection to ensure product quality. The system is decentralized in that final delivery, reprocessing, and distribution to dining facilities are the responsibility of the client. The prime vendor programs used by DoD and the VA are designed to obtain important services, such as variety (and associated inventory) and rapid delivery, in addition to food commodities. Vendors are expected to compete to offer packages of service and price. DoD and VA aim to ensure product quality through reliance on commercial labels and continued competition among vendors for contract renewals.

# CHAPTER 3

## USDA DOMESTIC FOOD PROCUREMENT: PROGRAMS AND EXPENDITURES

### Introduction

USDA purchases and distributes food commodities through 13 food assistance programs. Purchase and distribution activities are essentially the same for each program, but spending authorities, target populations, and program goals differ. The collective goals of the programs are to provide needy people with access to a more nutritious diet, to improve the eating habits of the Nation's children, and to stabilize farm prices through the distribution of surplus foods. This chapter summarizes USDA's food procurement programs, identifies their authorizing legislation, and details the recent history of annual expenditures under these programs.

### Programs and Supporting Legislation

Table 3-1 lists the 13 programs, identifies their target populations, links them to their supporting legislation, and shows the amounts spent on food procurement in fiscal 1996. The column headed "Section of public law" lists numbers that refer to the sections of the original legislation that authorize each program's procurement activity; those numbers are common references for program administrators.

The 13 programs spent a total of \$849 million on food procurement in fiscal 1996. The four largest programs—the National School Lunch Program (NSLP), the Food Distribution Program on Indian Reservations, the Commodity Supplemental Food Program, and Soup

Kitchens and Food Banks—purchased more than 95 percent of the total, about \$811 million. The NSLP alone accounted for almost 77 percent of the 1996 total, or \$652 million.

The 13 programs are authorized under several different statutes, which create a variety of funding sources and funding constraints for USDA. The first three programs in table 3-1, including the NSLP, are primarily supported by two separate congressional laws and subsequent amendments to these laws.

Section 32 refers to that section of the Agricultural Adjustment Act of 1935. The Section authorizes USDA to support prices of commodities in surplus by purchasing them in the marketplace, and also authorizes USDA to distribute commodities domestically. The legislation authorizes the funding of these activities with money collected from customs receipts; this funding is primarily administered by AMS to purchase meat and livestock, fruit and vegetable commodities, usually about \$400 million annually.

Funds used under section 32 are designed to support agricultural markets. As a result, the funds are to be applied to the purchase of relatively unprocessed food products that are close to agricultural commodities in the distribution chain. That is, the funds can be used to purchase pork but not frozen sausage pizza, and they can be used to purchase chicken but cannot be applied to paying for processing the chicken into chicken nuggets. In addition, section 32 money is intended to be

spent on products in surplus, reflecting the surplus removal goal under which USDA programs operate. Hence, those products must be designated as being in abundant supply. Because section 32 money can only be spent on surplus commodities, the legislation can lead to substantial year-to-year fluctuations in expenditures and in the mix of commodities purchased.

Section 6 refers to the National School Lunch Act of 1946, and authorizes USDA to purchase food products for distribution to the Nation's school children. Commodities purchased with Section 6 funds do not have to be in surplus because there is no requirement for supporting prices, but the available funds can vary with annual Congressional appropriations to FNS.

Under current procedures for the NSLP, schools receive a cash reimbursement of \$1.89 for each free meal served, \$1.49 for each reduced-price meal, and \$0.18 for each paid meal. In addition to cash, schools are entitled under Section 6 to receive 15 cents worth of commodity foods (those procured by AMS and FSA) for each meal served as well as Section 32 "bonus" com-

modities, as those commodities (and the funds to purchase them) become available. In total, about 17 percent of the dollar value of the food served in school lunch programs comes from USDA commodity purchase programs.

Free meals are offered to students from families with incomes that are no more than 130 percent of the poverty line income (or \$20,865 in 1996 for a family of four), while reduced-price meals are offered to those from families with incomes between 130 percent and 185 percent of the poverty line. About 25 million children, in 92,000 schools, participate in the NSLP, and more than half receive a free or reduced-price meal.

Two relatively small programs for the elderly, the Nutrition Program for the Elderly and Area Agencies on Aging, are authorized under Section 311 of the Older Americans Act of 1965. The U.S. Department of Health and Human Services administers these programs, while USDA purchases food products for them. Nearly 1 million meals a day are served under these programs.

**Table 3-1: Domestic food assistance programs for which USDA purchases food products**

Program acronym	Expenditures (million dollars <sup>1</sup> )	Section of public law	Name and target population
NSLP	652 (76.80)	32 - 6E	National School Lunch Program - schools
CACF	5 (0.61)	32 - 6E	Child and Adult Care Feeding Program - child care centers and special need adult care centers
SFSP	1 (0.14)	32 - 6E	Summer Food Service Program - summer meal service for needy children during the day
NPE	4 (0.51)	311	Nutrition Program for the Elderly - congregate feeding sites for elderly people (State option)
AAA	1 (0.18)	311	Area Agencies on Aging - congregate feeding sites for elderly people (State option)
FDPIR	74 (8.71)	4A	Food Distribution Program on Indian Reservations - food packages for needy Indian families
CSFP	48 (5.61)	17	Commodity Supplemental Food Program - food package for pregnant or postpartum women and children up to age 6
TEFAP	16 (1.93)	104	The Emergency Food Assistance Program - food for homeless or needy people/households
SKFB	37 (4.34)	110	Soup Kitchens and Food Banks - food for meal service at soup kitchens and food bank networks
CI	9 (1.01)	416	Charitable Institutions - nonprofit institutions
SC	<1 (0.01)	416	Summer Camps - nonprofit summer camps for children
FBDP	<1 (0.01)	32C	Food Bank Demonstration Projects - food banks in high-need areas
DF	1 (0.16)	32C	Disaster Feeding - food provided to or used to prepare meals for disaster victims

<sup>1</sup>Numbers in parentheses show percent of total food spending accounted for by the program.

Sections 4A and 17 refer to those sections in the Agriculture and Consumer Protection Act of 1973. This law authorizes the Food Distribution Program on Indian Reservations and the Commodity Supplemental Food Program. Each distributes food packages; about 115,000 people participate in the first, and about 400,000 in the second. These programs received the second and third largest amounts spent for commodity and product in fiscal 1996, over \$120 million.

Two programs were authorized through the Hunger Prevention Act of 1988. Section 104 authorizes USDA to distribute surplus commodities to needy individuals or households, while Section 110 authorizes USDA to purchase and distribute commodities and food products to soup kitchens and food banks.

Section 416 of the Agricultural Adjustment Act of 1949 authorizes the Commodity Credit Corporation (CCC) to make available CCC-owned commodities for distribution. FSA administers the CCC—a public corporation that supports the prices of commodities through nonrecourse commodity loans and manages commodities acquired by the agency. The commodities provided under Section 416 may be in private stocks or in public stocks that were acquired through forfeiture of nonrecourse commodity loans. Commodities donated under this legislation are known as bonus commodities, and

may be used in any of these programs.

Section 32C also refers to Section 32 in the Agricultural Adjustment Act of 1935. Section 32C funds are funds set aside by the Secretary for use in extreme surplus or to provide for disaster relief. These funds also come from customs receipts, and may also be used in any of the other programs in table 3-1. They are the primary source for the Food Demonstration Projects and Disaster Feeding Programs. Section 32C funds are used primarily for purchasing and distributing AMS commodities.

### Program Expenditures

FSA and AMS purchase different products. AMS is responsible for purchasing “Group A” commodities, which include poultry, red meat, fish, eggs, and fresh and processed fruits and vegetables. FSA purchases “Group B” commodities, which include dairy products (primarily cheese but also including butter and evaporated milk), grain-based products (such as wheat flour, corn products, pasta and ready-to-eat cereal), peanut products, honey, vegetable oil, rice, and infant formula. Most Group B products are derived from agricultural products that are or have been subject to agricultural support programs also administered by FSA.

Figure 1

## USDA food purchases for domestic feeding programs, 1979-96

Million dollars

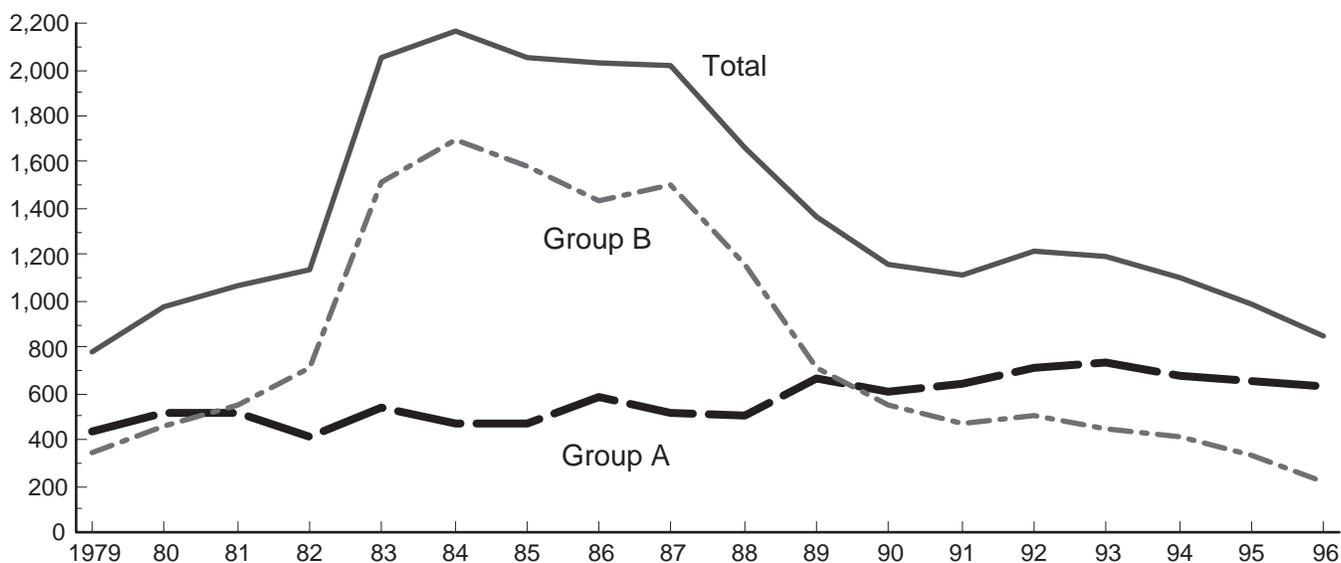


Figure 3-1 displays annual USDA expenditures, in current dollars, for domestic food procurement for a period starting in 1979 and ending in 1996. The data display a distinct pattern, with total expenditures rising steadily from \$785 million in 1979 to a peak of \$2.16 billion in 1984. After remaining just above \$2 billion through 1987, annual expenditures began a steady decline, to \$849 million in 1996.

The sharp post-1987 decline is driven by declines in Group B expenditures. Group A commodities show a modest upward trend, starting at around \$437 million in 1979 and reaching a peak of \$736 million in 1993, before declining to around \$629 million in 1996. But Group B commodities purchased by FSA show a far more dramatic cycle. Expenditures on those commodities rose from \$348 million in 1979 to a peak of \$1,692 million in 1984 (a 386-percent expansion in 5 years). Expenditures remained between \$1.4 billion and \$1.7 billion between 1983 and 1987, before beginning a steady and precipitous decline to \$220 million in 1996.

The sharp expansion in the early 1980's, and the subsequent contraction, reflected developments in agricultural commodity markets and USDA support programs. Falling world commodity prices, when set against relatively high USDA support prices, led to large USDA purchases through the CCC and an enormous increase in commodities available for the programs. Because the

expanded purchases largely went to programs other than school lunches, the importance of the NSLP in USDA purchases also varied through time, as figure 3-2 shows. In 1979, NSLP purchases accounted for 73 percent of total USDA purchases and 78.7 percent of FSA (Group B) purchases. At the peak expenditure year, in 1984, the NSLP share fell to 38 percent of total USDA purchases and just 26 percent of FSA purchases; by 1996, school lunch purchases were back to 78 percent of the total and 60 percent of FSA purchases.

**Table 3-2: FSA purchases by commodity group, 1993-95**

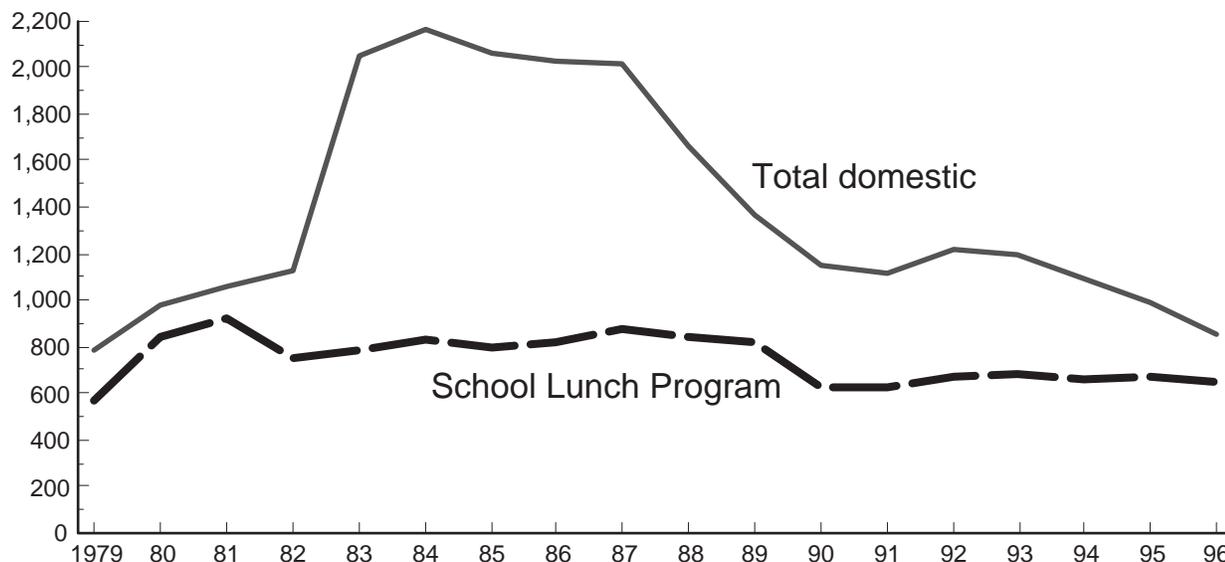
Commodity	Expenditures			1995 NSLP share of expenditures
	1993	1994	1995	
	— Million dollars—			Percent
Dairy	287.0	240.6	202.5	63.4
Flour	20.4	16.2	15.3	90.8
Peanut products	65.1	54.0	21.1	40.2
Pasta	9.5	11.5	11.5	28.7
Vegetable oil	34.8	43.2	21.2	95.1
Rice	11.4	16.6	12.3	18.4
Corn	9.5	17.0	1.2	44.5
RTE cereal <sup>1</sup>	6.3	4.3	4.7	0.0
Processed cereal	4.4	5.0	3.1	12.6
Honey	0.5	1.1	3.6	0.0
Total	448.8	409.5	296.5	59.6

<sup>1</sup>RTE cereal is ready-to-eat cereal.

Figure 3-2

### National School Lunch Programs account for a growing share of USDA food purchases

Million dollars



At present, FSA purchases of Group B commodities are increasingly concentrated on one major program, and are also concentrated on a major commodity group. Table 3-2 shows that dairy purchases now account for over 68 percent of FSA purchases, and for nearly two-thirds of the agency's NSLP purchases. In turn, cheese accounts for the major share of dairy purchases.

U.S. agricultural policy, as set in 1996 farm legislation, has moved away from a reliance on price supports for program commodities. If that policy continues, then procurement of bonus commodities under Section 416 legislation will become a less important driver of USDA procurement. In turn, annual entitlement appropriations will become more important, and the NSLP will continue to be the primary recipient of USDA foods.

# CHAPTER 4

## FSA PROCUREMENT AUCTIONS: HOW THE PROCESS WORKS

### Introduction

To understand the issues involved in structuring FSA auctions, one needs to understand how the existing process works. This chapter describes the steps involved in administering an FSA auction, using as an example an auction held by FSA's Kansas City Commodity Office (KCCO) in late March 1996 for products to be delivered to distributing agencies during May 1996. That auction is representative of most FSA auctions, but, at the close of the chapter, we discuss recent auction changes for some commodities.

Table 4-1 summarizes the auction; column 2 defines the key steps in the auction, while column 3 lists the associated dates. Column 4 lists the time remaining, at each step, until the beginning of the delivery month (May 1, in this case). Auctions for other months frequently have slightly different days of the month for the procurement activities, but essentially the same time remaining, after accounting for weekends and holidays, until the beginning of the delivery month. In a typical auction, KCCO aims to schedule dates for each step by working backward from the beginning of the delivery month. For example, KCCO aims to receive bids and select and inform auction winners during a period that is typically 5 to 6 weeks prior to the opening of the delivery month. Actual deliveries can be scheduled for two periods—the first or second half of the delivery month.

KCCO aims to prepare final invitations about 8 weeks (55 days) before the beginning of a delivery month. A

final invitation is FSA's notice of intent to purchase products, and is sent to vendors and the trade; it is a list of the tendered contracts for purchasing products. The 55-day span reflects auction experience: a shorter span would result in more failures to complete the remaining steps on time and could increase the cost of completing these activities.

FSA excludes product orders that do not arrive by the deadline. Excluded orders may sometimes be included in a special supplemental invitation and auction, with delivery in the same month as the current auction. Otherwise, late orders are held for the next month's auction.

A supplemental auction includes all the steps in other auctions, but with the time until the beginning of the delivery month compressed for steps 4 through 11. Generally, deliveries for a supplemental auction are in the latter half of the delivery month to ease the scheduling problems caused by missing the 55-day deadline. The current or regular auction has deliveries in both the first and second halves of the delivery month.

### The FSA Auction Process

#### Information and Client Planning

USDA's Food and Nutrition Service (FNS) provides client agencies with a list of products that can be obtained from FSA and AMS auctions along with their expected prices, based on experience and forecast infla-

tion. Client agencies include school systems as well as public and private social service agencies. Each client agency is also provided with a budget for domestic commodity distribution based upon the characteristics of the agency's target population, FNS entitlement rules, and the congressional appropriation for the current fiscal year.

Client agencies use the information to develop purchase plans, which form the basis for commodity and product orders to KCCO and AMS. The distributing agencies coordinate their plans for procurement through USDA auctions with plans for purchases with other funds. For example, school lunch providers will have access to entitlements earmarked for the purchase of FSA and AMS products, but they will also receive direct cash entitlements from FNS, revenues from the sale of lunches, and sometimes additional cash support from States and localities. In considering which FSA commodities to purchase with their food entitlements, clients will consider private sector prices and service quality, as well as menu needs, and aim to concentrate their FSA purchases on those products for which FSA offers the greatest competitive advantage.

### Developing an Invitation Worklist

Schools and other distributing agencies work with FNS regional offices to develop orders for USDA products, called "delivery orders." Delivery orders for FSA products are then sent by the regional offices to KCCO (steps 1 and 2 in table 4-1). An order specifies the product desired, order size, package size, and how the

product is to be shipped. Order sizes are in truckload units. A truckload unit may be split into two parts, with each part having its own final delivery destination, which is typically a warehouse designated by a coordinating State agency. Since FSA holds auctions monthly, with delivery 60-90 days after an order is placed, clients schedule their FSA purchases with that time frame in mind.

The orders are entered on worklists by KCCO, and arranged by commodity category and product. Worklists for each product are then distributed to KCCO personnel for preparation of the final invitation.

### Developing and Distributing Final Invitations

KCCO takes about 1 week to prepare final invitations (step 4), while making several decisions that can influence bid prices. Orders will sometimes be combined into a larger unit if several clients order the same product for delivery to the same location, on the grounds that larger orders may attract lower bid prices. The client agency also specifies a delivery window, either the first or second half of the delivery month, in order to give processors opportunities to spread production loads by having contracts for each delivery period. By spreading production, processors may lower costs and bids, and more processors may bid. But combining orders for the same destination may reduce opportunities for spreading production loads; therefore, judgments must be made about how to combine orders.

**Table 4-1: A work schedule for the March 1996 KCCO auction**

Step	Activity	Date	Days until (since) May 1
1	Clients submit product orders to FNS regional offices	Ongoing	Ongoing
2	FNS delivers orders to KCCO	March 5	57
3	KCCO completes invitation worklist	March 6	56
4	KCCO completes final invitation	March 7-1	51-55
5	Final invitation is distributed	March 12-14	48-50
6	Vendors prepare and submit bids	March 18	44
7	KCCO evaluates bids and selects winning bids	March 25	37
8	KCCO informs each winning bidder of awarded contracts	March 26	36
9	Awarded contracts are publicized via FSA Internet site	March 27	35
10	"Notices to Deliver" are sent to vendors	March 28-29	33-34
11	Vendors produce, package, and ship products	April 1 - May...	30 - ...
12	Clients receive orders	May 1- May 15 May 16 - May 31	0-(14) (15)-(30)

Notes: KCCO is Kansas City Commodity Office, FSA is Farm Service Agency, and FNS is Food and Nutrition Service, all with the U.S. Department of Agriculture.

Some orders are selected as small-business set asides. Set-aside contracts give qualified small businesses a 5 percent bidding advantage; that is, the award will be made to a small firm if its bid is no more than 5 percent greater than the best bid.

A final invitation for a particular commodity group, such as flour, will often cover many specific orders. That is, it will separately list each delivery of a specific product, distinguished by package size and precise characteristics. For each product order, it will list a city or town to which the product is to be delivered (sometimes, two will be listed for a split load). The invitation will specify the quantity being sought for each product and destination, and it will identify any specific transportation or distinctive packaging requirements.

KCCO solicits bids by sending the final invitation for each commodity category to the appropriate vendors (step 5). The agency also publicizes the final invitation to the trade and to the public for each product through mailings and through electronic postings on the Internet. After receiving the solicitation, vendors have about 1 week to prepare their bids and return them to KCCO.

### **Bid Preparation and Selection**

In preparing bids (step 6), vendors account for expected competition as well as product costs. Costs include the expected costs of processing, including labor, energy, and packaging materials, and also must reflect expected prices for the agricultural commodities that will be processed into FSA products. Bidders are generally fairly certain of future agricultural prices because bidding occurs only 1 to 6 weeks before processing and because many FSA products are based on agricultural commodities that have deep futures markets.

Bid prices are FOB destination at the warehouse and processor locations are specified by distributing agencies. Vendors pay transportation costs to receiving locations and, therefore, account for likely transportation costs when preparing bids. Bids also reflect distinctive USDA requirements, such as USDA labels, unusual packaging or product standards, and inspections.

Finally, bidders consider likely capacity utilization when preparing bids. Those who expect to have excess capacity at the time of processing are likely to bid aggressively (low). Since they will need to pay capital and other fixed costs whether they win the bid or not,

they will seek to win the bid as long as the revenues from winning exceed only the additional variable costs associated with filling an order. By contrast, firms that expect to be producing near full capacity will bid higher; for a winning bid to be worthwhile, it will have to return more to the firm than the production that it supplants. In short, firms will be more likely to add “capacity charges” to the bid when they are already producing near full capacity.

A vendor can specify a total quantity restriction; that is, the vendor can be awarded contracts only up to the restriction quantity, even if the vendor is the low bidder on other contracts. In addition, a vendor may submit a minimum quantity restriction that specifies the lowest quantity of product the vendor is willing to supply. The minimum restriction means that the vendor chooses not to be awarded any contracts if the total quantity won is less than the specified minimum.

Bids submitted by a vendor can vary among contracts, even among contracts for the same product to the same destination. However, a vendor can bid only one price for an entire contract. Frequently, bidders submit revised bids just before they are opened to reflect the latest market information.

### **Bid Evaluation and Selection of Winners**

KCCO opens all the bids at the same time (step 7). No revised bids are accepted after the envelopes are opened. The bids are evaluated and winners are selected on the day the envelopes are opened so that vendors can be notified the next day. Bids are binding contracts; selection of a winner obligates the winner to fulfill the contract even before being notified.

The bid evaluation is complicated because of the minimum and maximum quantity restrictions and the 5-percent bidding advantage given to small businesses. A search procedure implemented on the KCCO computer, known as linear programming, is used to select the combination of contract winners that yields the lowest total procurement costs while satisfying the restrictions.

Winning bids that are greater than a maximum purchase (constructed) price are reviewed. Constructed prices are based on prior experience and expectations of inflation, and are developed by KCCO commodity analysts prior to bid evaluation. KCCO may decide to accept the bid,

or they may approach the winning bidder and attempt to get the bid reduced, or they may reject the bid and cancel the contract. Orders in canceled contracts may be reintroduced in the next auction round, and those orders are delivered late to clients, or KCCO may issue a supplemental invitation to purchase the orders for the same delivery period.

### **Announcement of Awards**

Winning vendors are notified quickly, the day after selection, since those who have not already purchased materials (step 8) may consequently be placed in speculative positions. The price risks from these speculative positions increase in direct proportion to the elapsed time between bid submission and notification of contract awards. Winning bidders then have about 5-7 weeks to fulfill contracts with delivery in the first half of the delivery month, and about 7-9 weeks for contracts with delivery in the second half.

KCCO provides public notice of the auction results 2 days after bid openings and evaluations (step 9). The results revealed include the price and winning bidder on each contract. Releasing this information helps ensure the public that the auction is competitive and provides vendors that did not win with information about how much they must lower their bids to win at the next auction. It is important to release the information quickly because some losing bidders may have purchased materials in anticipation of winning contracts, and quick release allows for easier reallocation of materials. Finally, quick public release via electronic means saves resources for FSA and KCCO; agency personnel no longer have to respond directly to frequent requests for information.

### **Notices to Deliver**

KCCO produces a document for each contract, called the Notice to Deliver, and sends it to the winning bidder (step 10). The notice includes the product description (for example, rice, milled U.S. No. 2 medium), as well as the contract number, invitation number, delivery order number, commodity code, contract size, package size, and shipment mode. Notices also list the name, address, and telephone number of the vendor, the distributing agency, and the designated agency person responsible for receiving the product (the consignee). The notice to deliver provides the vendor with all the information necessary for fulfilling the contract.

### **Production and Shipping**

The vendor produces the product and ships it to the consignee (step 11). Contracts call for USDA inspectors to be on site at the plant during production runs for USDA commodities. Vendors must, therefore, arrange for inspection by personnel from AMS (peanut and dairy products and salad dressing) or GIPSA (all other items), and must generally time production runs for their presence. For remote or small plants, this can sometimes lead to delays. Inspectors monitor production processes and may perform some onsite tests. They certify product type, quality (through lab tests), and weight, and also certify that packaging meets contract standards for information, strength, and sanitary requirements. Most USDA products must be shipped with USDA labels, instead of the processor's normal brands or private labels.

Contracts also require that product samples be sent to USDA-approved labs for testing. Required tests vary with the product. For example, USDA aims for certain nutritional goals in cheese purchases, and also prefers a product that will melt properly when cooked, while stretching across a pizza or hamburger. Precise lab tests for cheese include tests of fat, moisture, salt, and acid content. Inspection procedures can also sometimes lead to delays, and products are sometimes shipped pending receipt of test results, at the vendor's risk.

Delays are not always due to USDA inspection and testing requirements. Sometimes processors will deliberately delay production because an unexpected, more lucrative, order came in. USDA can impose fines for late delivery, and can also suspend contracts for vendors that are chronically late. If USDA does not use the tools at its disposal, vendors can have strong incentives for late delivery, especially when vendors are producing near full capacity.

### **Distribution**

The vendor informs the distributing agency by fax that the product order is being shipped (step 12). This notification must be given on the date the product is shipped. The trucker or a rail employee calls the consignee, at least 24 hours prior to delivery, to schedule delivery. FSA products are often shipped to a manufacturing plant for further processing. For example, school districts often use FSA entitlements to purchase flour and cheese, which are then shipped to nearby proces-

sors who make them into frozen pizza or other more highly processed foods.

Title to the product is transferred from vendor to distributing agency at the receiving location when the consignee signs for the product. At this stage, USDA's responsibility for product quality ends. The consignee is then responsible for any further processing, as well as product transportation to client facilities and handling at dining facilities.

### **Recent Variants on the FSA Auction Process**

FSA has altered the typical process in recent auctions for several commodities. The alterations affect the timing of the auction process, the use of USDA labels, and the reliance on USDA inspection.

Commercially labeled items in five product categories—infant formula, evaporated milk, instant nonfat dry milk, ready-to-eat cereal, and rice cereal—are being purchased under a 5-year pilot program. The products are purchased not for the school lunch program but for two smaller programs—the Commodity Supplemental Food Program (CSFP) and the Food Distribution Program on Indian Reservations (FDPIR).

By purchasing commercially labeled products, vendors may supply USDA programs out of existing inventory, thus altering the production process outlined in step 11. Moreover, with commercial labels, FSA now relies on vendor certification of quality, since the vendor's brand is on the package. As a result, USDA inspection (also in step 11) is forgone.

The process outlined in table 4-1 uses a series of monthly auctions to procure products to be delivered to clients 5-9 weeks after the selection of winning bids. In

infant formula, KCCO has lengthened the contract to a full year, while at the same time allowing commercial labels on formula. Invitations now specify an indefinite quantity to be delivered throughout the year, instead of specifying precise quantities to be delivered to specific locations each month. Contracts can be less precise in infant formula because bids show no geographic variation. Because of the longer contract duration, the volume at bid is considerably larger, and KCCO hopes that larger volume will induce more competitive bidding among the small number of manufacturers. Similarly, KCCO has lengthened contract durations for ready-to-eat cereal purchases as part of the experiment in purchasing commercially labeled products.

KCCO has altered the bidding process in another way for cheese purchases. It now issues rolling invitations, covering several months, for deliveries of cheese. For example, KCCO will issue an invitation in July to bid on deliveries of cheese in specified 2-week windows from September through December. The August invitation will then include any new school orders for October through January deliveries. In essence, the new cheese process adds certain elements of flexibility: firms can now place bids further in the future than they did under the prior system, and they can achieve more certainty, in that they can commit to USDA production for a quarter of a year at a time instead of a month. Rolling contracts also provide KCCO with the opportunity to reject winning bids that are above constructed prices, and still deliver products on time.

Under the cheese experiment, KCCO enters orders as they come in. Clients now have some reason to enter early orders, since KCCO will act upon them. In addition, KCCO can use rolling contracts to encourage client agencies to shift the temporal pattern of their orders, away from peak and toward off-peak periods, to take advantage of seasonal price fluctuations.

# CHAPTER 5

## ISSUES IN USDA PROCUREMENT POLICIES

### Introduction

FSA sets precise requirements for the commodities that it buys for food assistance programs. Those requirements include product specifications (such as nutritional guidelines), packaging and labeling standards, and rules for product testing and onsite product inspection to ensure compliance with specifications. From those processors who are willing to offer products that meet FSA requirements, the agency then chooses vendors by using a bidding process, as outlined in chapter 4, that is designed to use competition to purchase products at the lowest feasible prices.

When FSA chooses a specific bidding process, it makes several other choices. It specifies the timing of the process: FSA decides when invitations to bid will be announced, when they will be closed, how quickly the award will be made upon closure, and how quickly the product must be delivered upon award. In defining the award and the bidding process, FSA also specifies any transportation requirements, plans solicitation of potential bidders, formulates procedures for aiding small businesses, sets damages for noncompliance with award requirements, and sets policies for cancellation of an invitation if bids appear to be noncompetitive.

Most awards are for precisely defined quantities (say, 42,800 pounds) of a precisely defined product (all-purpose bleached wheat flour in 50-pound bags) to be delivered to a precise location (a warehouse in Omaha, Nebraska) during a set time (between November 1 and

November 15). But in principle, the award could also be for the delivery of an indefinite quantity (with, for example, a minimum of 1 million pounds and a maximum of 25 million) throughout a year. In other words, FSA can also choose the duration and quantity of the award at bid.

FSA acts on behalf of other clients, such as State distributing agencies. When it designs the bidding process, FSA must also specify the timing that clients must follow to place orders. That is, client agencies must deliver food orders to FSA 55 days prior to the delivery month in order to be included in an invitation order to receive delivery in a specified time window. FSA's policy choices for order, auction, and delivery timing ultimately drive one dimension of service quality—temporal responsiveness to client orders.

These are all policy choices. FSA could choose other product requirements or other auction designs; alternative choices could affect processor costs, product prices, product quality, and FSA service quality. Actual choices often can involve a tradeoff of a gain in one dimension of performance against a loss in another (McAfee and McMillan, 1987; Laffont and Tirole, 1993; Wolfstetter, 1996). Key FSA decisions revolve around four interlinked areas: product packaging and labeling requirements, inspection requirements, the timing of order, bid, and delivery stages, and the design of procurement auctions. We discuss the issues surrounding these areas in this chapter, and begin by showing why we say these issues are interlinked.

## **Labels Require Inspection: The Need for Quality Certification in USDA Procurement**

FSA food procurement procedures are not unique, but they do differ in important ways from those used by commercial buyers, as well as some other government agencies. For example, some private firms (such as national fast food chains, retail supermarket firms, or wholesalers arranging for private-label products) will select a small set of qualified suppliers through an intense search. Once selected, a qualified supplier will receive a large volume of orders from the firm, at relatively profitable prices. Because the status of qualified supplier is so important to a supplier's profits, the supplier will have strong incentives to maintain agreed levels of quality and therefore to retain qualified supplier status. Firms using that procurement strategy, which is quite similar to prime vendor programs, trade off higher product prices to gain greater supplier efforts to maintain product quality and to provide timely service.

FSA uses auctions to procure food commodities, and the auctions are designed to get favorable prices for FSA clients by relying on price competition among bidders. That is, FSA does not form long-term relations with suppliers. Moreover, FSA generally does not purchase products with commercial labels (that is, common supermarket brands). Instead, USDA requires that all USDA products be packaged according to specific USDA directions and carry USDA labels. While the procedure can generate strong price competition among bidders, resulting in lower FSA costs, it also provides bidders with incentives to reduce their own costs by delivering low-quality products. Since the products do not carry commercial labels, quality problems will not damage the reputations of vendors' commercially labeled products; instead, USDA and its client agencies bear the risks of poor product quality.

FSA aims to control those risks by setting precise product specifications, by requiring the presence of USDA inspectors on site during production of USDA products, and by performing laboratory tests of product samples, to ensure that delivered products adhere to contract specifications. In short, FSA's inspection requirements follow from the use of USDA labeling requirements and a competitive bidding process.

Critics note four potential problems with current USDA product requirements. They may increase costs, both to

processors and to USDA, compared with commercial practices that realize the same quality goals. They may erode one dimension of service quality—the timeliness with which commodities are delivered to the warehouses designated by States, and ultimately to client agencies. They may limit competition for USDA awards, and thereby raise bidder prices, if some processors decide not to participate because of the requirements. Finally, they may limit the range of products available to school lunch programs and other USDA clients.

Some consumers associate the USDA label with low product quality, but in fact, FSA typically sets relatively high product specifications (for example, apples must be grade A, and rice must be U.S. No. 1). Actual quality problems rarely stem from poor product specifications or from lax inspection standards. Problems occasionally arise from poor vendor compliance with product specifications, and from inspector failures to immediately detect noncompliance. More often, quality problems can arise in the distribution channel. FSA's responsibility for product quality ends when commodities are delivered to warehouses; from there, responsibility for products falls to States and school districts. After being held in warehouses, products may be shipped to schools (using a variety of different forms of transportation) or they may be shipped to other plants for further processing before being shipped to school districts. At a district, products may be held in inventory and then prepared into meals at schools, or they may be prepared at a district's central kitchens before meals are transported to schools. Once meals are at a school cafeteria line, they may be on a serving line for a significant period of time before consumption. Product quality can deteriorate at each stage. Because of the time lags at each stage of delivery, unacceptable quality in a package of cheese or a can of peanut butter may not be detected until opened at a cafeteria. By then, several weeks or even months may have passed from the date the product was shipped from the manufacturer. In many cases, this sort of lag makes it difficult to assign accountability for quality problems.

### **USDA Inspection Requirements**

The Agency maintains a distinctive and relatively demanding set of inspection requirements. Contracts call for USDA inspectors to be on site at the plant during production runs for USDA commodities. Vendors must arrange for inspection by personnel from the Food and Drug Administration (FDA) for infant formula,

AMS (peanut and dairy products and salad dressing), or GIPSA (all other items), and must generally time production runs for their presence. Inspectors monitor production processes, assemble product samples for lab tests, and may perform some onsite tests. They certify product type, quality, and weight, and also certify that packaging meets contract standards for strength, information, and sanitary requirements.

Contracts also require that product samples be sent to USDA labs, or USDA-approved labs, for testing. Required tests vary with the product. For example, USDA aims for certain nutritional goals in cheese purchases, and also prefers a product that will melt properly when cooked, while stretching across a pizza or hamburger. Precise lab tests for cheese include tests of fat, moisture, salt, and acid content. Vendors pay fees for inspection and lab tests, fees that are ultimately recovered in product prices at auctions. Because USDA's tests are unique (some would not be done except for USDA requirements), they can increase bid prices by amounts ranging from 0.5 percent to 2.0 percent.

Inspection also can impose indirect costs on the programs. Some vendors, typically small plants in more remote locations, complain of problems in getting inspectors to come to the plant on a timely basis to inspect the USDA production run. Other vendors complain of lags in performing tests at USDA labs and reporting results back in a timely fashion. Some complain that specific required tests are not reliable or not useful. Such indirect costs show up as delays in delivery of products to State warehouses, and as reductions in the number of firms participating in FSA auctions.

Inspection is closely tied to USDA labeling; USDA labels place risks on the Department for product quality failures. A shift to more commercial labeling would also likely imply a shift to vendor certification of quality, with an attendant shift of responsibility to the vendor. That would not imply a cessation of USDA quality control activities, but rather a shift toward more random inspection of products, with a schedule of penalties and increased probabilities of inspection for noncompliant plants.

### **Commercial Labeling of USDA Products**

Reliance on USDA labels creates several kinds of costs to the system. USDA packages and labels are not free,

and there is some direct cost associated with them. But for regular participants in USDA programs, these do not necessarily increase final product costs compared with the use of commercial packaging and labeling. However, several types of indirect costs may be relevant. First, specific USDA packaging requirements can sometimes raise product costs if production lines are not designed for USDA packages. Second, firms that do not typically sell large volumes to USDA may have to place special orders for USDA packaging and labels, and that may either slow their delivery times or limit their participation in FSA bidding. Third, reliance on commodities that are USDA labeled prevents the Department from accessing excess inventories of commercially branded product that from time to time become available at low prices. Most important, reliance on USDA brands means that USDA bears the onus for poor quality control. Hence USDA labeling creates the need for reliance on government inspection for quality control, and that reliance does impose significant costs.

Our empirical research (described more fully in chapter 7) shows that FSA attracts only a few bidders for low-volume products. That is, more firms bid in auctions for flour in 10-pound packages (the most common type and the most common FSA flour purchase) than in auctions for flour in 50- or 100-pound packages, and more bid in auctions for bleached than for unbleached flour. Fewer bid in pasta auctions for rotini than for spaghetti, and fewer firms bid in auctions for low-fat peanut butter than for other kinds. Now, there may simply be fewer firms producing relatively unusual items, but the indirect costs of USDA requirements (the need to arrange for USDA labels and packaging, and to time runs for the presence of inspectors) may be more onerous for distinctive products, and may therefore limit the number of potential bidders. In turn, few bidders mean higher bid prices (also shown in chapter 7), thus limiting FSA's price advantage over other forms of procurement. If FSA's advantage is smallest in unusual and low-volume products, then FSA will be unable to offer a wide variety of products economically.

Proponents of restrictions on commercial labels advance three reasons for relying exclusively on USDA packaging and labeling. First, they assert that commercial labels can induce brand loyalty on the part of USDA clients. If clients insist on particular brands, then FSA buying power will be eroded as commodity volumes are split among brands, and FSA and its clients

will ultimately pay more for food. Second, most States now route USDA shipments through commercial warehouses before distribution to schools. Some argue that commercial warehouses with ties to particular brands will offer poor service on rival brands, or will refuse to carry them. Third, they argue that firms will be unwilling to offer their branded products at substantial discounts compared with normal commercial prices, and hence reliance on commercial brands will result in higher prices to FSA.

The third objection becomes irrelevant if processors are given the option of providing either commercial or USDA brands. The second objection should apply only in States in which a commercial warehouse has market power and the State has limited warehousing and distribution alternatives. With alternatives, States can simply cancel contracts for poor performers and shift to warehouseers who are willing to earn money by distributing the State's products. Warehousing is not generally thought of as a market activity where firms can maintain monopoly power; hence, all States should be able to develop alternatives to poor performers. As a result, the important issues for commercial labeling come down to brand loyalty.

Brand loyalty is an important issue. Research by ERS shows that leading branded food products in supermarkets often sell at prices that are substantially higher than corresponding nonbranded products, by over 30 percent, on average, for a sample of 30 staple products, such as rice, spaghetti, peanut butter, and flour—all products purchased by FSA (Kaufman et al., 1997). Given the price advantages held by strong brands, many firms will want to sell branded products to schools in hopes of developing brand loyalties that will persist as school children grow into adults.

USDA officials (as well as producers of nonbranded products) may react in a different way to the same data. They argue that USDA purchase policies should demonstrate wise shopping practices to schoolchildren by ignoring product differences based solely on image and aggressively seeking high-quality products at low prices. Bans on commercial labels would be the primary demonstration of that strategy, but not the only demonstration. USDA could alternatively pursue the purchase of private-label products generally produced for wholesalers and retailers, but under USDA specifications.

It is important to recognize that brand loyalty can mean different things for different FSA products, and it is possible that decisionmakers can improve program performance by a more discriminating use of commercial labels. For most FSA products, clients are not ultimate consumers, such as schoolchildren in school lunch programs, but rather school lunch administrators and cooks who prepare foods using USDA commodities. FSA's ultimate consumers see the package for only a few products. Moreover, only some products carry the distinctive flavoring or advertising images that create brand loyalty. In short, only some products carry the risk that use of commercially labeled product may induce later brand loyalty on the part of schoolchildren.

For example, several interviewees remarked that schoolchildren appeared to have strong taste preferences in some types of chicken products (nuggets, fingers): they wanted products to taste like those offered by leading fast food chains. Schoolchildren also clearly form strong preferences for different brands of ready-to-eat cereal. But many products do not carry strong brand attachments—for example, ground beef, pasta, flour, and many cheese products. FSA may need to identify those commodities where labeling and brand loyalty concerns are strongest, and discriminate between those and other commodities.

### **Issues of Timing and FSA Service Reliability**

We can think of quality in two dimensions. The first is product quality, which concerns the taste, nutritional adequacy, and deterioration of the products that FSA purchases on behalf of school districts and other clients. The second is FSA service quality, which concerns the speed with which the agency can respond to client requests for food products, the reliability of FSA deliveries (that is, the extent to which deliveries arrive when they are supposed to arrive), and the variety of FSA product offerings.

In considering FSA service quality, recall the timing of order and delivery from the point of view of clients in school districts. In the spring (March and April), State coordinators release information to school districts for the following school year. Included in the information is the likely size of district entitlements as well as the range of allocation among cash, AMS (Group A) commodities, and FSA (Group B) commodities. Also included is a listing of likely FSA and AMS commodi-

ties, and projected prices for those commodities. Many coordinators also offer advice on the most effective ways to spend entitlement dollars, and work with districts to identify cooperative purchasing arrangements through private vendors. Armed with this information, along with additional information on other revenue flows, prices for non-USDA food products, and meal requirements, school district administrators begin to plan food purchases and to place monthly orders with FSA, AMS, and private vendors for deliveries to support meals beginning in September.

By the time administrators place orders, school district plans have become relatively inflexible. Districts have typically designed menus by that time, and have placed orders for non-USDA commodities on the assumption that they will be receiving known combinations of USDA commodities at known dates. Failure to receive timely deliveries means that districts will often have to replace the USDA commodity with the same product purchased under unfavorable conditions from a private vendor. Late deliveries, therefore, impose substantial costs on school districts, and are a primary source of school district complaints about FSA service reliability.

Deliveries can be late because a vendor failed to meet the contractual delivery date in the award. They can also be late because FSA canceled an auction because bids were too high. Typically, FSA will issue a supplemental invitation and attempt to purchase the product for the same delivery period at a lower price. If this is not successful, KCCO will place the order and award up for bid again in the following month, so that cancellation then works out to late delivery. In FSA's view, cancellation is an important tool because it provides a means to induce bidders to bid more aggressively (that is, a low bidder is not guaranteed an award), it serves as a tool to police possible collusion among bidders, and it allows FSA to shift purchases in response to unexpected increases in prices.

From the point of view of school districts, cancellations impose significant immediate costs on them in return for uncertain and hard-to-document future gains in prices. Moreover, to the extent that the gains arise from reduced collusion and more aggressive bidding, they are shared by all districts, while the costs are borne by those whose auctions were canceled. Because of the costs imposed, FSA needs to do more to identify the size of any benefits in order to justify this strategy.

Vendor failures can occur for several reasons. At peak production periods, vendors may win an award, and then receive an unexpected order from a higher paying client. The vendor may then choose to ignore the agreed delivery date and accept an FSA fine for late delivery. During fall harvest periods, transportation may at times be difficult to arrange, and during the winter, deliveries may be held up because of bad weather. Deliveries can also be late because vendors had difficulty arranging for inspectors, or because AMS labs were slow in performing tests.

### **Adjustments in the Bidding Process**

Commodity volumes, competition, and seasonality all seem to affect bid prices. KCCO purchase strategies might be able to affect bid prices by influencing these factors.

KCCO argues that competition, measured by the number of bidders for an award, is an important determinant of prices. That view is supported by the economic theory of auctions, by a considerable amount of empirical research on procurement through auctions, and by our own analyses of auctions carried out by KCCO (chapter 7). KCCO also believes that the number of bidders is in turn influenced by the size of the contract—that is, the volume being purchased. Chapter 3 shows that KCCO volumes have fallen sharply in recent years. But ERS research suggests that monthly volumes have only small effects on bidder numbers and bid prices. We believe that product characteristics and expected capacity utilization in the industry have more important impacts on bidder numbers. Moreover, our analyses show that bidder numbers have large effects on prices only when the number of bidders is very small. In other words, losing a competitor has a much more important effect on price when there are only two competitors to begin with than when there are four or five.

KCCO does face tight oligopolies: for example, ready-to-eat cereals and infant formula are each produced by a very small number of firms. Moreover, government procurement is subject to collusive bid-rigging among participants, as well as more tacit (and legal) attempts by vendors to refrain from strong price competition (Brannman, 1996). This is more likely to occur when the same few bidders respond to the monthly invitations to bid. Some of the commodities that USDA purchases have strong seasonal demand patterns. For example,

retail sales of flour surge in the late fall, so flour mills operate near their production capacities in early and mid-fall, preparing to meet the seasonal increase in retail purchases. Mills will bid higher prices when they operate near capacity than when they have substantial excess capacity. Consequently, flour bids show a seasonal pattern of increases during the peak fall season and offpeak declines. KCCO thus realizes better prices and more competition for invitations during offpeak seasons.

KCCO has altered the bidding process for several commodities in hopes of reducing bid prices. For example, the contract duration for infant formula has been lengthened to a full year, from 3 months, at the same time that commercial labels for formula have been allowed. A longer duration contract increases the volume at stake in a bid; KCCO hopes that longer duration, higher volume contracts will induce more competitive bidding among the small number of formula vendors. Similarly, KCCO has lengthened contract durations for ready-to-eat cereal purchases as part of an experiment in purchasing commercially labeled products.

KCCO has altered the bidding process in another way for cheese purchases. It now issues rolling invitations, covering several months, for deliveries of cheese. For example, the office will offer an invitation in July to bid on deliveries of cheese in specified 2-week windows from September through December. The August invitation will then include any new school orders for October through January deliveries. In essence, the new cheese process adds certain elements of flexibility: firms can now place bids further in the future than they did under the prior system, and they can achieve more certainty in that they can commit to USDA production for a quarter of a year at a time instead of a month.

Under the cheese experiment, KCCO enters school cheese orders as they come in. Schools now have some reason to enter early orders, since KCCO will act upon them. These rolling contracts may also allow KCCO to improve timeliness in product delivery, by providing the office with the flexibility to reject contracts and reopen auctions while still meeting desired delivery dates. For other commodities, KCCO would like to encourage schools to shift the temporal pattern of their orders away from peak and toward offpeak periods to take advantage of seasonal price fluctuations. To expand this experiment, FSA and its clients may need changes in spending authority to shift expenditures from one fiscal year to another.

Longer contract durations, in which firms place bids on deliveries further in the future, will introduce some new risks into USDA procurement. When bidding on a short-duration contract (for example, bidding in October for the November delivery of flour), firms may be quite confident that input price risks are low; that is, vendors bid with firm knowledge of the likely level of wheat prices when placing bids to deliver flour. They may also be quite confident that capacity risks are low; that is, vendors bid with firm knowledge that plant capacity will be lightly utilized (in which case they will bid low) or heavily utilized (leading to a higher bid). With contracts of longer duration (bidding in October for March delivery), firms will have less certainty about input prices and capacity utilization well into the future. Because of greater uncertainty, longer contract durations could lead to higher prices for USDA commodities, even if the greater volumes in longer duration contracts attracted more bidders. USDA could reduce the risks from input price uncertainty, and could therefore induce lower bids, by allowing bids to be indexed to a measure of input prices.

# CHAPTER 6

## DATA FOR EMPIRICAL ANALYSES OF FSA AUCTIONS

### Introduction

FSA amasses data while administering auctions, data that can be used to investigate the factors driving bids and to compare FSA bids with private sector prices for comparable items, as a step in evaluating auction strategy. To perform that evaluation, FSA provided ERS with auction records for five commodity categories—all-purpose flour, bakery flour, pasta products, vegetable oil, and peanut butter—for the 5 years covering January 1992 through December 1996.

This initial analysis focused on just five commodity categories because that seemed like a manageable number for a new project. The records were not kept in electronic format, but in paper archives, and included separate records for approximately 2,000 to 6,000 auctions for each commodity category. Coding the records into electronic format was a major task, and limited our original commodity coverage.

The five chosen were important FSA commodities that were closely linked to related agricultural commodities (wheat, peanuts, and soybean and cottonseed oils) with reliable data on prices. The major omitted category, cheese, is a large category undergoing substantial changes in agricultural commodity pricing. ERS will investigate cheese auctions in later analyses.

### Data Sources and Definitions of Variables

#### Auction Records

Much of the data are derived from records (“PPCR30 forms”) generated by FSA during the bidding process. Each record refers to an auction of a specific commodity on a specific date for delivery to a warehouse within a State (or to a plant for further processing) during a specified 2-week time window, generally 5-8 weeks after the auction (see table 4-1).

Each record specifies the commodity up for bid, with a precise description of package size and distinguishing product characteristics. It specifies the quantity up for bid (usually between one and five truckloads, but specified in pounds), as well as the place and the State to which the product is to be delivered. Separate bidder codes identify each bidder, the bidder’s price, whether a bidder is a qualified small business, and the “constructed price” developed by FSA prior to the auction. The file also identifies the date of the auction and the month and 2-week time window (first or second half of a month) for delivery.

Most of our discussion in this report emphasizes the lowest bid in FSA auctions, which also is usually, but not always, the winning bid (see chapters 2 and 4 for an overview of the process and the determination of winning bids). Some analyses investigate a dataset consist-

ing of all bids in a commodity category, although we can say that the general factors driving low bids also drive other bids. In the sections that follow, we discuss the explanatory variables that we think account for fluctuations in bids.

### Specific Agricultural Price Measures

We expected that FSA bids would be closely linked to price movements in related underlying agricultural commodities. Moreover, key agricultural prices showed a strong pattern during the period: wheat and oilseed prices rose sharply from 1992 through 1995, before abating somewhat in late 1996. To analyze that linkage, we obtained monthly USDA price data for key commodities. We generally developed price series for three variables: the average cash price in the month of delivery, the change in the average cash price between the delivery month and the following month, and the change in the average cash price between the delivery month and the prior month. By using these measures, we can distinguish the effects of longrun shifts in price from shortrun shocks. That distinction turns out to be useful (chapter 7) because it appears that month-to-month price fluctuations have little or no effect on FSA prices, while longer run shifts have large effects.

All-purpose flour uses a variety of different wheats. In our statistical analysis, we found that one wheat price series fit the data best, and that other price series added no additional explanatory power to our models. Consequently, we relied on the series for No. 2 Soft Red Winter Wheat (St. Louis). For bakery flour, we found that a different series fit the data best, so we relied on prices for No. 1 Hard Red Winter Wheat, Ordinary Protein (Kansas City). Pasta uses durum wheat, so we relied on the price series for No. 1 Hard Amber Durum (Minneapolis). All three monthly wheat price series are reported in the *1997 Wheat Yearbook* (ERS/USDA).

In contrast to flour and pasta, we found that two agricultural price series were important in explaining FSA vegetable oil bids. Soybean oil is the primary ingredient, but cottonseed oil is also important and statistically relevant. We consequently used wholesale prices for Crude Soybean Oil (Decatur) and the Crude Cottonseed Oil (Mississippi Valley points), as reported in the *Oil Crops Yearbook* (ERS/USDA).

Peanut butter presented more of a challenge. Peanut

butter is purchased throughout the year, so we have FSA monthly prices for the product, but peanuts are marketed only in part of the year, so peanut prices are generally available for the period from August through January. We tried several approaches to handle months outside of the marketing year. First, we dispensed with monthly peanut price data and used average annual (marketing year) prices for each month, but found that they fit the data poorly. We then used monthly data, and assigned the price for January (the last observed price) to the remaining months before a new marketing year. Finally, the best specification used that second approach, but allowed the regression coefficient on the January price to vary by month during the rest of the year. In other words, the third approach added interaction terms between the assigned monthly price and the month. Monthly peanut prices were also taken from the *Oil Crops Yearbook*.

### Specific Measures of Purchase Scale

Chapter 3 showed that FSA commodity purchases declined sharply during the 1992-96 period. We wanted to assess the effect of that decline, if any, on prices. To do that, we used the PPCR30 records and calculated monthly sums of FSA purchases; we refer to that measure as the monthly “FSA volume” in a commodity category.

FSA volumes are not the only “volume effect” worthy of study. FSA also purchases quantities of commodities for delivery overseas, and these vary widely from month to month. We wanted to know whether FSA foreign purchase volumes affect domestic purchase prices. We obtained data on monthly commodity volume in international (PL480) auctions for flour and vegetable oil products, and designated these as “PL480 volume.” We matched PL480 volumes to the delivery months of FSA domestic auctions, but our analysis is limited by an important problem of timing. Our domestic volumes measure the amount to be delivered in any month, but the PL480 variable measures the amount that is contracted for in any month—and contracting occurs some time before delivery. As a result, the two volume measures may not match up appropriately.

The amount of a product to be delivered to any specific domestic location in any particular auction also varies in the data; generally, from one to five truckloads are up for bid for delivery to a particular location in a particular time window. We wanted to know whether these

**Table 6-1--Product characteristics and their share of commodity category auctions**

Commodity & characteristic <sup>1</sup>	Auction share	Commodity & characteristic	Auction share
	<i>Percent</i>		<i>Percent</i>
<b>All-purpose flour</b> (5,727)		<b>Bakery flour</b> (1,712)	
5-lb. bag	34.47	50-lb. bag	9.58
10-lb. bag	46.20	100-lb. bag	13.64
50-lb. bag	19.20	Bulk	76.78
100-lb. bag	0.13	Unbleached	33.85
Unbleached	1.83	Bleached	66.15
Bleached	98.17	Hearth	13.30
<b>Pasta</b> (4,781)		<b>Shortening &amp; vegetable oil</b> (7,153)	
Spaghetti, 2-lb. box	12.38	Shortening, 3-lb. can	24.60
Spaghetti, 20-lb. carton	25.37	Shortening, 50-lb. cube	3.86
Macaroni, 1-lb. box	17.71	Shortening, 1-gal. can	11.17
Macaroni, 20-lb. carton	24.05	Vegetable oil, 48 oz. bottle	1.54
Rotini, 20-lb. carton	20.49	Vegetable oil, Bulk	7.95
		Vegetable oil, 1-gal. bottle	50.88
<b>Peanut butter</b> (5,243)			
Smooth, 2-lb. can	66.53		
Smooth, # 10 can	33.28		
Reduced fat, smooth, # 10	0.19		

<sup>1</sup>Numbers in parentheses are the total number of auctions analyzed in each commodity category.

variations in auction quantity (designated in our tables as “truckloads in order”) have any effect on prices, and so we retained this variable directly from the PPCR30 records. Finally, inspection of the data reveals that there are large and persistent product flows to some locations, but other locations receive only small and sporadic deliveries. We suspected that remote locations that rarely received deliveries might be bid at higher prices. To investigate that possibility, we calculated the total number of auctions for a location in the 1992-96 period from the PPCR30 records, and designated that variable as “total orders at location.”

### Measures of Product Characteristics

Each of the five commodity categories contains a variety of specific products distinguished by package size and by product characteristics. These factors can have important effects on costs and prices, and need to be controlled for in analyses. All of our measures were taken directly from the PPCR30 forms.

We dropped some very rare commodity types and package sizes from the analysis. In addition, we dropped some auctions with incomplete or inaccurate data, and

those with delivery destinations outside the 48 contiguous United States. Table 6-1 lists the package sizes and product characteristics for the products retained for each commodity category, as well as the share of each in the commodity category auctions that were retained for the analysis. Numbers in parentheses are the total number of auctions retained for analysis in each commodity category.

### Measures of Competition

We used the PPCR30 forms to determine the number of bidders in each auction. Because we thought it likely that the effect of an additional competitor on price would depend on the number of existing bidders, we did not simply use the number of bidders as an explanatory variable (MacDonald, 1987). Instead, we defined a series of categorical variables, each of which takes a value of zero or one. If an auction had a single

bidder, a variable defined as “one bidder” would take on a value of one, while other bidder variables would be zero. If an auction had two bidders, the variable “two bidders” would be set equal to one, and others set to zero; similar variables were specified for each level of competition. Tables 6-3 through 6-7 (discussed below) summarize bidder numbers across the different commodity groups and over time.

### Seasonal and Locational Effects

FSA prices clearly vary with the location to which a product is delivered. For example, to deliver bakery flour to Vermont, either wheat or flour will have to be shipped there, incurring greater transport costs than if an order of flour were to be delivered to a client in Kansas. To account for location, we entered separate State effects. When State effects are entered, the coefficients on other variables show how prices vary from the State-specific means as other variables vary from their State-specific means; the State coefficients then show how mean prices vary from State to State.

Similarly, FSA prices and orders show clear seasonal variations. Because our analyses control for underlying

**Table 6-2--Monthly variation in FSA auctions, by commodity category**

Delivery month	Monthly share of auctions, by commodity category				
	All purpose flour	Bakery flour	Pasta	Vegetable oil	Peanut butter
	<i>Percent</i>				
January	7.75	17.32	11.92	11.46	11.12
February	15.19	15.32	9.13	9.65	9.46
March	10.84	12.11	7.34	5.11	8.18
April	7.62	13.05	5.69	5.11	7.74
May	6.46	8.87	5.96	3.12	7.84
June	8.01	8.02	5.56	4.49	7.13
July	8.89	1.41	9.12	6.77	8.70
August	13.02	1.80	11.61	13.92	10.65
September	9.16	8.26	14.26	13.34	10.19
October	3.17	4.96	6.53	9.01	4.88
November	4.13	4.41	6.44	11.01	7.15
December	5.76	4.47	6.44	7.01	6.96

**Table 6-3: All-purpose flour auctions, volume and bidders**

	1992	1993	1994	1995	1996
Volume	85,772	35,273	21,600	27,130	17,950
Auctions	2,518	1,087	742	809	561
Number of bidders	<i>Percent of annual volume</i>				
1	1.3	15.6	1.4	13.2	3.7
2	9.8	20.9	28.7	25.6	14.9
3	15.3	33.6	33.4	26.3	25.3
4	20.6	13.6	21.7	22.5	33.8
5	24.7	8.1	5.9	11.0	20.0
6	16.7	5.1	8.9	1.4	1.7
7 or more	11.4	3.1	0.0	0.1	0.6

**Table 6-4: Bakery flour auctions, volume and bidders**

	1992	1993	1994	1995	1996
Volume	35,434	12,735	11,814	9,420	5,286
Auctions	722	342	264	231	141
Number of bidders	<i>Percent of annual volume</i>				
1	27.8	13.8	62.9	12.6	19.6
2	33.7	45.3	27.1	35.6	23.9
3	31.8	16.3	4.1	30.3	40.7
4	5.5	4.6	5.9	12.2	14.0
5	0.9	0.0	0.0	9.3	1.7
6	0.4	0.0	0.0	0.0	0.0

**Table 6-5: Pasta auctions, volume and bidders**

	1992	1993	1994	1995	1996
Volume	21,360	20,908	15,288	18,252	13,741
Auctions	1,076	1,047	784	893	688
Number of bidders	<i>Percent of annual volume</i>				
1	25.4	33.1	12.7	4.2	19.9
2	35.1	26.0	28.5	26.3	39.3
3	25.8	24.2	36.0	32.7	29.2
4	9.2	12.4	15.6	18.3	8.4
5	4.3	3.1	6.0	11.8	2.8
6 or more	0.2	1.1	1.2	6.7	0.6

**Table 6-6: Vegetable oil auctions, volume and bidders**

	1992	1993	1994	1995	1996
Volume	44,385	43,550	40,182	23,618	20,071
Auctions	1,821	1,727	1,650	1,022	857
Number of bidders	<i>Percent of annual volume</i>				
1	10.3	18.6	12.8	2.2	4.2
2	52.1	43.9	39.5	53.4	74.2
3	23.4	26.5	38.9	31.9	17.3
4	12.6	7.6	6.3	9.6	3.3
5	1.5	3.1	2.3	2.7	1.0
6	0.1	0.3	0.1	0.2	0.0

**Table 6-7: Peanut butter auctions, volume and bidders**

	1992	1993	1994	1995	1996
Volume	38,200	29,917	22,621	14,121	8,877
Auctions	1,711	1,348	1,046	637	427
Number of bidders	<i>Percent of annual volume</i>				
2	0.4	0.2	0.2	1.6	1.7
3	9.0	6.4	0.0	0.3	0.6
4	32.1	29.1	7.4	3.4	16.2
5	52.7	48.9	23.5	30.4	47.1
6	5.6	15.5	47.8	47.1	34.5
7	0.2	0.0	21.0	17.0	0.0

commodity prices, seasonal variation in FSA prices reflects variations in marketing margins through the year. To control for the phenomenon, we enter separate variables for each month in our analysis. Table 6-2 shows how orders vary by month for each commodity category. With 12 months, an “average” month ought to handle about 8.3 percent of a category’s auctions.

## Some Basic Data Patterns

### Volume and Competition

Tables 6-3 through 6-7 provide summary information on commodity volumes and bidder numbers for each commodity by year. Consider, for example, all-purpose flour, in table 6-3.

Awards totaling 85,772 tons (just under 4,000 truck-loads) were put up for auction in 1992 in 2,518 auctions. In that year, 1.3 percent of that volume (or about 1,115 tons) was offered in auctions that attracted only a single bidder, while another 9.8 percent was offered in auctions that attracted two bidders. In that year, it was far more typical for all-purpose flour auctions to attract four (20.6 percent of volume) or five (24.7 percent of volume) bidders.

Volumes dropped by nearly 80 percent over the next 4 years, as CCC stocks fell. There was also a clear shift in bidder numbers; most auctions in 1993-95 attracted three or fewer bidders, in contrast to the generally greater participation in 1992 auctions. But bidder numbers rose again at the end of the period, in 1996, as more auctions attracted four and five bidders.

The other four commodity groups show similar trends in purchase volumes. Bakery flour and peanut butter each showed 1992-96 declines of more than 75 percent in volume and number of auctions, while vegetable oil fell by more than half and pasta by more than a third. Typical bidder numbers vary across commodity groups and over time. Bakery flour and vegetable oil auctions typically attract relatively few bidders. Until 1994, more than half of all bakery flour auctions attracted only one or two bidders, while that same pattern held in all years for vegetable oil. By contrast, more than half of all pasta auctions attracted at least three bidders after 1992, and peanut butter auctions rarely attracted fewer than four bidders.

### Price Trends

Table 6-8 displays broad trends in average FSA prices across the five commodity groups during the 1992-96 period. Prices are not comparable across commodities because they are quoted in different units (dollars per hundredweight, cents per gallon), but they show some interesting temporal patterns. The three wheat-based commodities show sharp increases over time, about 18-25 percent between 1992 and 1996. Low bids in vegetable oil auctions rose by about one-third between 1992 and 1994, before dropping off somewhat in the next 2 years, while peanut butter bids fell (15 percent) between 1992 and 1995 before rising in 1996.

The trends in low bids could reflect the effects of changes in competition, the geographic distribution of auctions, or the mix of products and package sizes purchased, but those factors really have only very minor effects on the broad trends. The major factor driving broad temporal movements in FSA prices is underlying agricultural commodity prices: wheat prices rose sharply through the period, soybean and cottonseed oil prices rose and then fell somewhat, and peanut prices generally fell.

**Table 6-8: Price trends in FSA auctions**

Commodity group	1992	1993	1994	1995	1996
<i>Mean low bids in FSA auctions (dollars)</i>					
All-purpose flour	13.08	12.27	13.35	15.08	16.60
Bakery flour	12.27	12.50	14.02	14.81	16.81
Pasta	27.46	26.27	29.77	30.36	32.24
Vegetable oil	32.27	36.64	42.59	42.21	39.50
Peanut butter	83.07	78.07	74.62	70.93	78.82
<i>Mean ratio of low bid to FSA constructed price</i>					
All-purpose flour	.812	.803	.815	.833	.859
Bakery flour	.859	.861	.867	.881	.897
Pasta	.892	.891	.902	.898	.913
Vegetable oil	.760	.783	.823	.808	.762
Peanut butter	.895	.886	.881	.876	.888
<i>Mean ratio of low bid to second lowest bid</i>					
All-purpose flour	.963	.947	.935	.939	.955
Bakery flour	.947	.945	.929	.936	.946
Pasta	.937	.942	.953	.947	.956
Vegetable oil	.974	.978	.972	.977	.975
Peanut butter	.985	.981	.982	.976	.978

FSA develops a “constructed” price for comparison purposes for each auction. The constructed price is used as a forecast tool to develop expectations about likely bid ranges, and it can also be used as a decision tool in that FSA may cancel auctions in which the low bid exceeds the constructed price. The middle panel in table 6-8 shows annual average ratios of low bids to constructed prices. Two factors stand out. First, the ratios clearly vary systematically, and by quite a bit, across commodity categories. Pasta ratios are always the highest, around 0.90, while vegetable oil ratios are generally the lowest, around 0.80. Second, the ratios seem to move up, sometimes sharply, as commodity prices rise. That pattern raises the question of whether FSA proper-

ly accounts for the effects of changes in agricultural prices when calculating constructed prices; there is some evidence in this pattern that the agency underestimates the sensitivity of bid prices to agricultural prices.

Finally, the bottom panel reports average ratios of low bids to the second lowest bid in FSA auctions (clearly, this ratio can only be calculated when there are at least two bidders). That ratio shows no particular time pattern, suggesting that all bids rise in unison as agricultural prices rise. They also show some distinctive difference across commodity groups. Peanut butter low bidders beat the number two bidder by only about 2 percent, for example, while, on average, low bidders in pasta are 5-7 percent below the second lowest bidder.

# CHAPTER 7

## STATISTICAL ANALYSIS OF BID PRICES FOR FIVE FSA COMMODITIES

### Introduction

The statistical analysis aimed to answer the following questions:

- ◆ How do variations in related agricultural commodity prices affect FSA bids?
- ◆ Are FSA bid prices affected by declining FSA auction volumes?
- ◆ Do PL480 (international) shipments affect FSA domestic bids?
- ◆ Do FSA bid prices vary with requested package sizes? By how much?
- ◆ Do other product characteristics affect bid prices? By how much?
- ◆ Do bid prices show important seasonal variations?
- ◆ How important are transport costs?
- ◆ Do changes in the number of bidders affect FSA bid prices? By how much?
- ◆ What factors drive changes in bidder numbers?

The first question, the relationship of agricultural commodity prices to FSA bid prices, relates to FSA's ability to predict likely bid prices and to agency decisions to

cancel auctions when prices are unacceptably high. For most commodities, changes in related agricultural commodities are the most important factor driving temporal changes in FSA bid prices, and many agricultural commodity prices fluctuate sharply through time. The analysis aims to identify typical responses of FSA bids to changes in commodity prices; with that information, FSA should be better able to identify those cases in which bid prices are unusually high.

The other questions relate to issues that FSA has some influence over. There have been fairly large changes over time in FSA monthly purchase volumes for both domestic and foreign (PL480) programs. In principle, if monthly volumes had a large effect on prices, FSA could consider altering purchase strategies in an attempt to reach volumes associated with the lowest prices. If the data were to show strong seasonal effects, FSA could move to shift the temporal pattern of purchases to low-priced months. Either decision would impose storage and transactions costs on clients, such as school lunch programs; the information from the analyses could help clients decide whether the price gains from volume shifting were large enough to offset any added costs.

Similarly, clients purchase a variety of specific products (for example, pasta can be spaghetti, macaroni, or rotini) in a variety of package sizes. Statistical information on the price effects of these choices can guide clients in making better decisions.

Over time, the typical number of bidders in FSA auctions has generally declined; moreover, during any given year, there are often large variations in the number of bidders participating in different auctions. Our analysis attempts to identify the effect of the number of bidders on prices, and to identify the factors affecting variations in the number of bidders. Information on the issues can help FSA to better identify those commodities, locations, and periods in which actions to increase competition would be most effective.

## Methods

ERS investigated the above issues with regression analyses of FSA bid prices. Most regressions focused on the low bids in FSA auctions, although some analyzed all bids. The regression analyses aim to estimate the effect of variations in particular variables (for example, the number of bidders) on FSA bid prices, while controlling for other variables. For example, suppose that, on average, low bids in FSA auctions were higher in those auctions in which only a single bidder participated. That pattern could appear because of a lack of competition, but it could also appear if single-bidder auctions were more likely in auctions for delivery to high-cost, remote locations, or if single-bidder auctions were more likely during periods of high agricultural commodity prices. In regression analyses, we try to control for those other factors so we can more precisely identify the reasons for observed statistical relations. In other words, our analyses are designed to ask whether prices are higher in single-bidder auctions for given levels of agricultural prices and transport costs.

Regression analyses can be flexible in the sense that we can use them to see whether effects are linear or nonlinear. For example, it is reasonable to think that adding an extra bidder in a market with a single bidder might have a bigger effect on prices than adding another bidder in a market that already has six bidders; in short, the effect of adding a bidder varies with the number of bidders. Our analyses are designed to assess alternative specifications of how one variable might affect another.

No analysis is perfect. We will not be able to control for all possible factors that affect bid prices, and we will not be able to test among all possible (or even likely) ways in which the variables affect price. But we can provide a substantial amount of useful information. This chapter summarizes the key findings. Data sources

and variable definitions were summarized in chapter 6.

## Summary of Results from the Regression Analysis

We summarize the key findings below. Our discussion is organized around groupings of key related variables, and we attempt to emphasize the size of our reported effects and their implications in our discussions. Exact regression results, which contain a large number of separate coefficients and associated statistical tests, are reported in appendix B.

### Linkages Between FSA Prices and Agricultural Commodity Prices

FSA purchases basic products that are closely linked to agricultural commodities. Some agricultural commodities display wide price swings through time, and these swings can have strong impacts on FSA product prices. Our statistical analysis allows us to identify the effects of agricultural commodity price changes on FSA bid prices. For this analysis, and those that follow, we regressed low bids in FSA auctions on the average delivery month spot price of the agricultural product, as well as the change in the agricultural price for 1 month back and 1 month forward. Other controls included product characteristics, the number of bidders, measures of auction volume, fixed monthly effects, and fixed State effects. Table 7-1 shows the results.

We list the related agricultural commodity for each of our five FSA products. The list is not exhaustive; for example, all-purpose flour uses wheats other than No. 2 soft white, but that price series gave the best fit to our data. In vegetable oil, two price series, for cottonseed oil and for soybean oil, gave the best statistical fit to the data when they were both used.

We represent the effect of agricultural price changes in two ways. First, we show the estimated effect on FSA prices of 10-percent increases in agricultural prices. The two flour products (bakery and all-purpose) show the strongest responses, 7.0 percent and 7.9 percent. By contrast, pasta prices are noticeably less responsive to wheat price changes, with a 3.4-percent increase in pasta prices following a 10-percent increase in durum wheat prices. Pasta requires more processing than flour, with the result that durum wheat is a smaller part of total pasta costs; hence wheat price changes have weaker effects on pasta prices than on flour prices.

The evaluation performed above asked how FSA product prices changed in response to uniform 10-percent increases in agricultural commodity prices. But some agricultural commodity prices fluctuate widely, while others do not. The final column looks at agricultural price effects in another way. It shows the estimated change in FSA product prices in response to a “typical” large change in an agricultural commodity’s price.

Here, “typical” is defined as a two-standard-deviation change in price. If prices are normally distributed, then roughly 95 percent of observed prices will fall within two standard deviations of the mean price (that is, from two standard deviations above the mean to two standard deviations below). The calculated standard deviation will be quite small if prices in the sample show little variation, and it will be large in samples in which prices vary widely. In our analysis, “typical” large price changes have very little effect on peanut butter prices because peanut prices varied very little in 1992-96. By contrast, flour prices can easily vary by 20 percent in response to typical wheat price changes because wheat prices show some substantial variation and because flour prices are quite sensitive to wheat price changes.

The price effects in these models should be thought of as longrun effects; for example, they show how flour prices change in response to a 10-percent increase in wheat prices over those observed 1 year earlier. The models also show that FSA bid prices do not respond nearly as strongly to shortrun month-to-month fluctuations in agricultural commodity prices. In general, if agricultural commodity prices were to rise by 10 percent in a month, the resulting FSA bid prices could be expected to rise by about one-fifth as much as the numbers shown in table 7-1 (bakery flour bid prices would rise by 1.4 percent instead of 7 percent).

The longrun effects for wheat-based products are larger than one would expect to see for normal commercial distribution. As a first approximation, if an agricultural commodity price rose by 10 percent, we would normally expect manufacturer product prices to rise by an amount directly proportional to the share of the commodity in manufacturer costs. For example, U.S. Census Bureau data show that wheat accounts for 59 percent of flour mill costs; we would, therefore, expect flour prices to increase by 5.9 percent, following a 10-percent increase in wheat prices. But table 7-1 shows that FSA flour prices were more sensitive to wheat prices, with all-purpose flour rising by 7.9 percent and bakery flour by 7.0 percent. Following the same reasoning, Census data suggest that pasta prices should rise by 1.9 percent (wheat accounts for 19 percent of pasta costs), but FSA pasta prices rose by 3.4 percent in response to a 10-percent increase in wheat prices. Similarly, FSA peanut butter prices rise by 5.5 percent for each 10-percent increase in peanut prices, whereas Census data suggest that commercial prices would rise by about 3.5 percent. Only in vegetable oil were FSA prices in line with expectations: Census data suggest that vegetable oil prices should rise by 4.7 percent in response to a 10-percent increase in underlying agricultural commodity prices, while FSA prices rose by 4.0 percent.

The results imply that some FSA prices may be more sensitive to changes in agricultural commodity prices than commercial products are, an issue explored further in chapter 8, where we compare trends in FSA prices to trends in average manufacturer and retailer prices for similar products. This sensitivity is not undesirable, since it can come about if FSA is getting highly competitive prices for the products that it buys. In that case, agricultural commodity costs could be larger shares of FSA product costs than of commercial product costs.

**Table 7-1: Projected effect of changes in agricultural commodity prices on FSA product prices**

FSA commodity	Related agricultural commodity	Effect on FSA price of 10 percent increase agricultural price	Effect on FSA price of typical increase in agricultural price
		<i>Percent</i>	
All-purpose flour	No. 2 soft white winter	7.9	21
Bakery flour	No. 1 hard red winter wheat	7.0	19
Pasta	Durum wheat	3.4	16
Vegetable oil	Cottonseed & soybean oil	4.0	16
Peanut butter	Peanuts	5.3	5

Notes: The measures are derived from regressions of low bids on agricultural commodity prices, volume, product characteristics, measures of competition, seasonality terms, and fixed State effects. The typical increase in an agricultural price is a two-standard-deviation change in price.

## Effects of Geographic Location on FSA Bid Prices

The FSA data clearly show that bid prices vary with the location to which the product is to be delivered. We identified the locational pattern of prices by entering separate variables representing each State into our regression analysis. The resulting estimates show how average bid prices vary across States, given product and packaging characteristics, seasonality controls, auction volumes, agricultural commodity prices, and levels of competition. Table 7-2 provides a summary of the results, by listing, for each of the five FSA products, the lowest price State, the highest price State, and the estimated price gap between the two.

Locational effects largely reflect transportation costs. The lowest price States are the States where production of the FSA product and the related agricultural commodity are concentrated—Kansas for flour and wheat, Minnesota for pasta and durum wheat, Georgia for peanuts and peanut butter, and Iowa for soybeans and salad oil. Very little transportation is required to deliver bakery flour to Kansas or peanut butter to Georgia. State effects increase as one moves away from production centers and incurs transport costs for the agricultural commodity, for the FSA product, or both. For flour, pasta, and peanut butter, prices are highest in New England and in the Middle Atlantic States.

Transportation costs are important parts of the final cost of the product for some locations and some commodities. For example, table 7-2 shows that prices for delivery of all-purpose flour to Maine are 31.1 percent higher, on average, than prices for delivery to Kansas. Other New England States face prices only slightly

lower than Maine, and Middle Atlantic States (New Jersey, for example) see prices that are a little over 20 percent higher than Kansas prices. For distant locations like Maine, transport costs will account for over 20 percent of the delivered price of flour, while transport costs will account for less than 5 percent in Plains and Western Corn Belt States.

Transport costs are also less important for more highly processed products, like pasta and peanut butter. Prices rise for each product as one moves away from production centers, but prices for delivery of pasta to New England are only 12.7 percent higher than Minnesota prices because transport costs are a smaller share of the total for this product that has a higher value per hundredweight than flour.

## Seasonality Effects

Each FSA product displays persistent seasonal movements in bid prices. These movements are analyzed in a model that already controls for agricultural commodity prices, so the seasonal effects capture movements in margins (the gap between product prices and agricultural commodity prices). The model includes separate variables for each month, and the results should be interpreted as showing differences in average prices across months, once one controls for agricultural commodity prices, product and packaging characteristics, measures of competition, and location and volume effects. Table 7-3 presents summary data on the monthly averages.

Flour and pasta products show persistent and fairly strong monthly effects. In each case, monthly peaks occur for products to be delivered in September, with

**Table 7-2: Effects of geographic location on FSA commodity prices**

FSA commodity	Low-price State	High-price State	Price gap
			<i>Percent of low</i>
All-purpose flour	Kansas	Maine	31.1
Bakery flour	Kansas	West Virginia	35.4
Pasta	Minnesota	New Hampshire	12.7
Vegetable oil	Iowa	Nevada	9.4
Peanut butter	Georgia	Rhode Island	7.5

Notes: The results are derived from the fixed State effects in the low bids regression, and measure the difference between the highest and lowest State effect.

**Table 7-3: Effects of seasonality on FSA commodity margins**

FSA commodity	Low month	High month	Price gap
			<i>Percent of low</i>
All-purpose flour	August	September	6.2
Bakery flour	July	September	14.7
Pasta	June	September	8.7
Vegetable oil	September	February	7.6
Peanut butter	May	December	3.9

Notes: The measures are derived from the fixed monthly effects in low bids regressions, and report the difference between the high and low months.

monthly troughs occurring just 1 to 3 months earlier. For both pasta and all-purpose flour, schools purchase disproportionate amounts for delivery in September—14 percent of pasta auctions and 9 percent of all-purpose flour auctions are for September delivery. This is particularly interesting because data presented in chapter 8 suggest that FSA prices are closest to commercial flour prices in September—that is by far the least favorable month for FSA to buy flour. The results indicate that schools contemplating peak-period purchases could save 6-9 percent on the purchase price, and possibly more compared with commercial prices, by shifting purchases to an earlier month. To decide if that strategy makes sense, buyers would have to weigh the purchase price savings against storage costs and risks of product deterioration.

The seasonal movements most likely reflect changes in capacity utilization at mills. For example, retail demand for flour increases sharply in the fall, leading to increases in capacity utilization at flour mills. Mills operating at full capacity are less likely to bid on USDA purchases, and when they do bid, they are likely to bid high. By contrast, mills operating with excess capacity are likely to bid more aggressively for USDA

production because winning a bid will not lead to the displacement of other production.

### How FSA Bids Vary with Product Characteristics

The five FSA commodities analyzed in this section can be purchased in a variety of different package sizes and in several specific product types. Bid prices vary systematically with these product types, and table 7-4 summarizes the average effects on bid prices.

In the statistical analysis, one specific product is chosen as the base size and product type, and prices for other sizes and product types are expressed as percentage deviations from the base price. We used a common product as the base in each FSA commodity category—5-pound bags of unbleached all-purpose flour, unbleached bakery flour delivered in bulk, spaghetti in 1-pound boxes, vegetable oil in 1-gallon bottles, and smooth peanut butter in 12-ounce cans.

The results are in line with what one might expect. The price per hundredweight falls as products are shipped in larger package sizes, although the magnitude of the

package size effect varies across commodity categories. In all-purpose flour, for example, prices fall by a little over 5 percent as one moves from 5-pound to 100-pound bags. Prices fall more in moving from 50- and 100-pound bags in bakery flour to bulk shipment (13 and 10 percent, respectively). Package size effects in vegetable oil are quite large; prices rise by 34 percent as one moves to a 48-ounce container from a 128-ounce (1-gallon) container, and falls by 22 percent if one moves to bulk delivery from the 128-ounce container.

Product characteristics also matter. Macaroni and rotini cost about 10 percent more than spaghetti, while reduced-fat peanut butter, introduced in small samples near the end of the period, carries a price premium of nearly 40 percent over regular peanut butter.

**Table 7-4: Effect of product characteristics on FSA prices**

FSA commodity & base product characteristics	Alternate product characteristics	Price effect
		<i>Percent of base</i>
All-purpose flour Base: 5-lb. bag, unbleached	10-lb. bag	-1.8
	50-lb. bag	-4.6
	100-lb. bag	-5.6
	Bleached, 5-lb. bag	+1.9
Bakery flour Base: unbleached, bulk	50-lb. bag	+13.0
	100-lb. bag	+9.8
	Bleached, bulk	-1.4
	Hearth, bulk, unbleached	+8.2
Pasta Base: Spaghetti, 20-lb. box	Spaghetti, 2-lb. box	+4.0
	Macaroni, 1-lb. box	+9.7
	Macaroni, 20-lb. carton	+1.3
	Rotini, 20-lb. carton	+8.1
Vegetable oil Base: veg oil, 1-gal. bottle	Shtng/hydrog veg oil, 3-lb. can	+19.8
	Shtng/hydrog veg oil, 50-lb. can	-2.0
	Shtng/hydrog veg oil, 1-gal.	+4.9
	Veg oil, 48-oz. container	+34.2
	Veg oil, bulk	-22.3
Peanut butter Base: Smooth, 2-lb. can	Smooth, # 10 can	-1.2
	Smooth, reduced fat, # 10 can	+38.5

## Purchase Volumes and FSA Prices

Monthly volumes of FSA commodity purchases declined sharply during the 1992-96 period. We wanted to assess the effect of that decline, if any, on prices. But that is not the only “volume effect” worthy of study in the dataset. FSA also purchases quantities of commodities for delivery overseas, and these monthly PL480 commodity volumes vary widely from month to month. We wanted to know if FSA foreign purchase volumes affected domestic purchase prices. In addition, the amount of product to be delivered to any specific domestic location in any particular auction also varies in the data; generally, one to five truckloads are up for bid for delivery to a particular location in a particular time window. We wanted to know if these variations in auction quantity had any effect on prices. Finally, inspection of the data reveals that there are large and persistent flows of product to some locations, but other locations receive only small and sporadic deliveries. We wanted to know if the total number of auctions for a location in the 1992-96 period had an effect on prices. That is, we suspected that remote locations that rarely received deliveries might be bid at higher prices. Table 7-5 summarizes the results of the statistical analysis of the effect of volume.

In general, auction quantities had small negative effects on price: moving from small (single-truckload) quantities to two- and three-truckload quantities would reduce

bid prices by 0.5 percent to 1 percent in bakery flour, pasta, and vegetable oil, but had no discernible effects in all-purpose flour and peanut butter. Technically, that the coefficients on auction quantity in the all-purpose flour and peanut butter regressions were not significantly different from zero, and, with very large sample sizes, this means that the estimated coefficients were also very small. The other three regressions had statistically significant, negative coefficients, and the reported effects are the change in price attendant upon a two-standard-deviation change in quantity (see our earlier discussion of agricultural commodity price effects for why we use two-standard-deviation changes, and what they are).

Location volumes also mattered in that locations that regularly received deliveries generated bid prices that were between 0.5 percent and 1.5 percent lower than locations that rarely received deliveries. The effect, while small, appeared for four of the five FSA commodities; all-purpose flour was again an exception.

Three commodities are also shipped overseas as part of FSA’s PL480 purchases—all-purpose and bread flour (we used all PL480 purchases of wheat flour), as well as vegetable oil. Mean monthly domestic purchases were close to mean monthly PL480 purchases, and the estimated coefficients of domestic and PL480 purchases were almost identical in each regression; that is, what appears to matter for prices is the total monthly volume

**Table 7-5: Effects of purchase volumes on FSA prices**

FSA commodity	Auction quantity	Total auctions at location	Volume measures	
			Monthly FSA commodity volume	Monthly PL480 commodity volume
All-purpose flour	No effect	No effect	U-shaped, small (1.5 percent) negative effect at mean	U-shaped, zero effect at mean
Bakery flour	Small (0.5 percent) negative effect	Small (1.5 percent) negative effect	U-shaped, modest (2.5 percent) & negative at mean	U-shaped, modest (3.5 percent) and negative at mean
Pasta	Small (0.5 percent) negative effect	Small (0.5 percent) negative effect	Large (6 percent) negative effect	n.a.
Vegetable oil	Small (1 percent) negative effect	Small (1 percent) negative effect	U-shaped, zero at means, negative at small volumes	U-shaped, zero at means, negative at small volumes
Peanut butter	No effect	Small (1 percent) negative effect	Large (7 percent) positive effect	n.a.

Note: n.a. means not applicable.

of USDA purchases, and not whether those purchases are foreign or domestic. In one sense though, PL480 purchases are more important: the standard deviation of PL480 volume is triple that of domestic volumes. That is, there is a lot more month-to-month variation in PL480 purchases, primarily because there are many months with low PL480 purchases.

The estimated effects of monthly purchase volume appear to be complicated, but the complicated effect is statistically quite significant, and the same pattern shows up in all three FSA commodities (therefore, there is good reason to believe that the complicated pattern is true and not some statistical artifact). The complicated effect is that the pattern is “U-shaped.” That is, at low volumes of USDA purchases, increasing the volume of purchases will lead to lower bid prices. At high volumes (for example, when USDA is already purchasing large volumes through PL480), increases in domestic purchase volumes will lead to higher prices. The effects are not particularly large (in the range of 1-4 percent, depending on volumes). At sample means, the effects of changes in volume are close to zero.

Our analysis is limited by one important problem of timing. Our domestic volumes measure the amount to be delivered in any month. But the PL480 variable measures the amount that is contracted for in any month, and contracting occurs some time before delivery. As a result, the two volume measures may not match up appropriately. We experimented with different ways of handling the problem, but the estimation results were unchanged.

Two commodities, pasta and peanut butter, do not have corresponding PL480 purchase volume. In each, monthly volume has large effects, but of opposite sign. Typical increases in pasta volumes are associated with 6-percent declines in pasta prices, while typical increases in peanut butter volume are associated with 7-percent increases in peanut butter prices. We suspected that these results might have been spurious, picking up trends in the data that were otherwise unaccounted for, but the estimated volume effects did not change when we took steps to account for time trends.

## Effect of Competition on Bid Prices

The number of bidders varies across FSA auctions. Some commodities, like peanut butter, almost always have at least three firms bidding, and usually get four, five, or six. In bakery flour, pasta, and vegetable oil, auctions more typically attract only one or two bidders (chapter 6). Competition varies sharply over time, as well, in all five commodity groups. For example, in 1994, only 1 in 10 bakery flour auctions had more than 2 bidders, while half of the 1995 bakery flour auctions attracted more than 2 bidders (chapter 6).

Competition, as measured by the number of bidders, can affect the value of an auction’s low bid in two ways. First, there could be a direct effect on bidder decisions: they may decide to offer lower bid prices in auctions with more bidders participating so as to improve their chances of winning. Second, there could be an indirect, or “selection,” effect on the low bid, even if individual bidders do not change their bidding strategies in the face of more competition. With more bidders, there is a greater likelihood that someone with low costs (due perhaps to excess capacity) will participate, generating a lower low-bid price.

We can assess each of these effects with the FSA data that we have at hand. That is, we can see if the number of bidders affects the value of the low bid in FSA auctions by analyzing a dataset consisting of the low bids in each auction. Second, we can see whether competition has a direct effect on bidder strategies by using a dataset consisting of all bids, and testing to see whether bidders changed their bids in response to changes in the number of competitors.

Competition has important effects on FSA commodity prices (table 7-6). First, consider the analysis of low

**Table 7-6: Effects of competition on FSA prices**

FSA commodity	Low bids		All bids	
	Range of price effect	Single-bidder effect	Range of price effect	Single-bidder effect
	<i>Percent</i>			
All-purpose flour	11.4	7.2	4.0	3.6
Bakery flour	8.0	5.6	9.1	6.1
Pasta	10.9	3.9	0 (not sig.)	0 (not sig.)
Vegetable oil	8.6	5.3	11.2	7.9
Peanut butter	4.6	n.a.	6.9	n.a.

Note: “not sig.” means not significantly different from zero in statistical tests. n.a. means not applicable.

bids. In the first row, the “range of price effect” for all-purpose flour is reported to be 11.4 percent. The statistic means that, on average, low bids in all-purpose flour auctions with a single bidder are 11.4 percent higher than low bids in all-purpose flour auctions with the maximum number of bidders specified in the model, which in all-purpose flour is seven. The estimated “single-bidder effect” in all-purpose flour is 7.2 percent; that is, low bids rose by 7.2 percent as the number of bidders falls from two bidders to one. Combined, those two statistics suggest that some competition matters a lot: most of the effect of reducing the number of bidders (7.2 of 11.4 percent) occurs as we move between two bidders and one, while the effect of moving from seven to two is much smaller (4.2 percent).

Results in the other four FSA commodity groups are similar. As the number of bidders goes from two to one, low bids rose by 5.6 percent and 5.3 percent in bakery flour and vegetable oil, respectively. As the number of bidders goes from five (the maximum in each) to two, low bids rose modestly, by 2.4 percent and 3.3 percent respectively. Peanut butter had no single-bidder auctions: there, low bids rose (by 4.6 percent) as the number of bidders fell from six to two. Pasta shows some distinction in that prices rose more sharply (by 7 percent) as the number of bidders fell to two from five. Pasta low bids increased again, by 3.9 percent, as the number of bidders fell from two to one.

The results thus far suggest that changes in bidder numbers matter, but that such changes generally matter most where there are a small number of bidders. That is, the number of bidders affects auction prices most when there are only two or three bidders to begin with; when there are four or five bidders, auction prices are affected less by the number of bidders.

The results reported so far are based on an analysis of the low bids in each auction. We can try to gain additional information with an analysis of all bids in FSA auctions (sample sizes in the all-bids analyses are three to four times larger than in the low-bids analysis). Consider the all-purpose flour results first. When there is a single bidder, that bidder typically bids a price 3.6 percent higher than the bidder would bid in a situation that was identical except for the presence of two bidders. In other words, bidders do appear to change their strategies in response to changes in the number of bidders, but the effect is small; selection appears to dominate changes in bidder behavior.

The results in pasta provide stronger support for selection. There, the number of bids has no significant effect on bidder behavior (a bidder does not change a bid as the number of bidders changes). But low bids are substantially lower when there are many bidders. Taken together, the two results suggest that selection effects account entirely for the effects of competition on low bids in pasta.

Results differ in the other three FSA commodities. In bakery flour, vegetable oil, and peanut butter, bidders reduce their bids as the number of bidders rises, and the effects are larger than in the low bids dataset. Selection does not appear to be a driving force here, and the direct effects of competition matter most.

The effects of competition appear to be quite robust because of the regression specification that we use. In early models with few other controls, bid prices appeared to be higher where there were few bidders. We were concerned that the observed effects might be spurious. Specifically, we were concerned that remote locations that were more costly to serve might attract few bidders and might also generate high bid prices because they were costly to serve. But the final model reported here has an extensive set of controls, including the State that the product is to be delivered to, the flow of product to specific locations, and the characteristics of the items being auctioned. Holding all those constant, the results still show the number of bidders to have strong effects on bid prices.

Tables 6-3 through 6-7 show that competition appears to vary sharply over time, while table 7-6 shows that competition strongly affects bid prices. What factors drive the extent of competition? We have not been able to perform a complete analysis, but several factors stand out. Product volumes only modestly affect the number of bidders. As changes in national policy reduced CCC stocks, tables 6-3 through 6-7 show that FSA product volumes fell dramatically for each commodity between 1992 and 1996, by amounts ranging from 36 percent of 1992 pasta volume to 85 percent for bakery flour. Bidder numbers showed no such steady decline, but rather a mixed pattern of increases and decreases.

In interviews, some vendors stressed the importance of capacity utilization in manufacturing plants. They argued that, during periods of low utilization, vendors are more likely to bid on USDA products, and are more

likely to bid aggressively. They asserted that this was because USDA auction procedures generated competitive prices and, therefore, relatively low margins for vendors; they would, therefore, only aim to win auctions when USDA production was unlikely to replace other, high-margin, business. The data offer some support for this hypothesis. For example, in flour mills, capacity utilization peaks in the late summer and fall (August through November, for delivery to FSA clients in September through December). Those 4 months account for a roughly proportional share (34.7 percent) of all FSA all-purpose flour auctions but a hugely disproportionate share (84.8 percent) of the auctions that attract only a single bidder. In short, competition has a clear seasonal pattern, and the risks of attracting a single bidder rise sharply in the fall.

The data also show annual fluctuations in competition that do not necessarily follow patterns of capacity utilization. Our inspection of bidding records shows considerable persistence in patterns of bidding. That is,

once a firm enters bidding, it tends to stay in, offering bids every month from at least some plants on at least some auctions. Similarly, once a firm drops out of bidding for USDA products, it tends to stay out, rarely coming back in. Very few firms come in and out of bidding status. Those patterns appear to suggest that FSA marketing of their auction programs may have had some effects on firms' decisions to participate. Further, each commodity had sharp reductions in bidder numbers in one year during the study period (all-purpose flour in 1993, bakery flour in 1994, pasta in 1993, vegetable oil in 1993, and peanut butter in 1992). None of the reductions held: average bidder numbers increased sharply in the year after the reduction for each commodity. That pattern may reflect simple market entry (declines in bidder numbers drove up prices and profits, thereby attracting more bidders), or it may reflect positive actions taken by FSA to attract more players. FSA needs to review their actions here in order to identify effective strategies.

# CHAPTER 8

## COMPARING FSA TO COMMERCIAL PRICES

### Introduction

We perform two types of price comparisons in this chapter. First, we compare price levels by matching the prices that FSA receives in auctions for several commodities with prices quoted by manufacturers to private sector clients for closely related commodities. Second, we compare price trends by matching changes in FSA prices over the 1992-96 period to well-known indexes of food price inflation for related commodities.

### Comparisons of FSA Price Levels with Comparable Private Sector Prices

#### Method of Comparing Prices

One of our major goals was to compare the prices realized in FSA auctions with those that could be obtained through private sector purchasing. To do that, we solicited the cooperation of a major foodservice wholesaler. Foodservice firms take deliveries to their own warehouses from food manufacturers, and provide food products and support services to restaurant and fast food chains, schools, commercial kitchens, hospitals, and other large providers. Such firms operate as prime vendors in the VA and DoD food procurement systems. Foodservice warehouses are the appropriate point of price comparison for FSA because the firms order large volumes of products from manufacturers, take delivery in truckload lots, and are located at the same level of the distribution chain as the State and commercial warehouses that receive FSA commodities.

The cooperating firm provided us with data on 1996 manufacturer prices for delivery to the firm's warehouses. We asked the firm to provide price data for their highest quality private-label product because we felt that was most comparable with USDA products. In some cases, we received branded product prices rather than private-label, and we note those cases in our discussion. We strove to compare identical package sizes and product characteristics, but at times, had to compare closely related (rather than identical) products; we define product characteristics, and any adjustments that we made, in the discussion below.

Some FSA product prices can vary sharply by geographic region. Consequently, we asked for prices for delivery to several different States served by the foodservice firm—California, Texas, Illinois, and Massachusetts. Because FSA prices show some seasonal variability, we also asked for two time periods—April and September 1996.

The cooperating foodservice firm was able to provide us only with September data for peanut butter and pasta, and only on a nationwide price quote. We therefore compared those prices to nationwide average FSA prices for September 1996. In addition, FSA data show few 1996 auctions for delivery to two of the cooperator's States, Illinois and Massachusetts, so we used mean FSA prices for points in Illinois, Indiana, and Wisconsin for comparison with foodservice prices in the firm's Illinois district. We also used mean FSA prices for delivery throughout New England for comparison to the Massachusetts District. FSA prices vary

little (1-2 percent) within each region, and FSA mean prices, therefore, are not driven by any unusual price quotes from remote locations.

## Results of Price Comparisons

Table 8-1 reports the results of our price comparisons. In general, FSA prices were substantially below those reported by the private sector firm, with a gap of about 30 percent being most common. We discuss each commodity in turn; we discuss flour last, since it presents a more complicated pattern.

**Liquid Shortening and Vegetable Oil.** We obtained private-sector prices for truckload delivery in cases containing six 1-gallon containers, and compared them with FSA auction prices for identical package sizes. We had only limited FSA California data (for September delivery of vegetable oil), but could perform price comparisons for both months for all other locations. Our results show substantial price advantages for FSA, larger in the fall than in the spring. On average, FSA shortening prices were 31.5 percent below private sector prices in September and 26.5 percent lower in April. Vegetable oil prices averaged 34.9 percent lower in September (excluding those for California, which would expand the gap more) and were 28.8 percent lower, on average, in April.

**Pasta.** We compared prices for truckload delivery of 20-lb. cartons of three products—spaghetti, elbow macaroni, and rotini. We used nationwide average prices for FSA data, for September 1996, and the results were quite consistent across the three products (table 8-1): FSA prices were consistently 37-38 percent lower than private sector prices. Our cooperator did not specify whether the price quotes were for a branded or private-label product, but branding should not be an important price factor in this (20-pound) package size.

**Peanut Butter.** The cooperator provided price quotes for delivery of truckload quantities of a branded smooth peanut butter in cases of 12 24-ounce containers. FSA prices are quoted for delivery of truckload quantities of smooth peanut butter in cases of 24 32-ounce containers. Our data show that FSA prices were, on average, 17.6 percent below those of the private sector product in September 1996. Because the private sector containers are slightly smaller, they should carry a higher price for the added convenience, but we did no direct adjustment because we had no basis for one. Based on our

experience with other price comparisons, we would estimate that the container difference accounts for about 2 percent of the 17.6 percent gap. Another point of difference in this comparison was that we had to match a USDA-labeled product with a branded product, and many purchasers might prefer to pay a price gap of this size in exchange for the greater perceived quality assurance associated with the branded product.

**All-Purpose and Bakery Flour.** The flour results show a strong temporal shift consistent with other ERS research on flour pricing. The cooperator provided us with data for the delivery of all-purpose flour in truckload quantities of cases containing eight 5-pound bags, and for delivery of truckload quantities of bread flour in 50-pound bags. The quoted prices were for a branded product, and branded products carry a modest price premium at small package sizes (5-pound bags) in flour. Prices for three locations (California, Texas, and Illinois) and 2 months (April and September) were cited. FSA runs some auctions for delivery of all-purpose flour in 5-pound bags, but 10-pound bags were far more common in 1996, so we also used FSA 10-pound auctions and adjusted those prices up by 2 percent, the package size premium estimated in our price regressions. FSA purchases bread flour in 50-pound bags, the same size as the cooperator.

FSA all-purpose flour prices were substantially below private sector prices in April: by 31.5 percent for Texas delivery, 31.1 percent for Illinois, and 7.8 percent for California (the cooperator's California prices were estimated and are considerably less reliable). But in September, FSA prices were only 14.3 percent below private sector prices in Texas and California and 17.4 percent lower in the upper Midwest.

Bread flour is a far thinner FSA market; there were no FSA auctions for the relevant months in Texas and California. In Illinois, FSA prices were 21.7 percent below corresponding private sector prices in April, but in September, were quite close to private sector quotes (3.5 percent lower), consistent with the all-purpose flour results. Finally, FSA prices rose sharply in October and November 1996 to levels above the September private sector prices (we do not have access to the cooperator's later prices).

Why are September prices so much closer? In brief, the data show that FSA prices rise during the fall, while private sector prices decline. Three factors drive the

seasonal increase in FSA prices. First, wheat prices (the primary material cost) show some seasonal variation, and typically rise slightly in the fall. Second, flour demand rises quite sharply during the fall. FSA bidders bid more aggressively when they expect to have excess production capacity, and they have little excess capacity at that time; as a result, they include capacity charges in their fall bids. Finally, and also because of capacity limits, fewer firms bid in fall FSA auctions, leading to higher bids. In short, FSA prices rise because costs rise and also because FSA auctions become less competitive in the fall.

In contrast to FSA price patterns, retail prices for flour typically drop sharply in the fall, by as much as 20 percent, just as demand is increasing sharply. Other ERS research has identified patterns of falling prices in the face of seasonal demand surges for most retail food products with strong seasonal demand swings, and the pattern appears to be quite strong for flour. Prices in retail markets move closer to costs in the fall apparently because seasonal demand surges lead to greater competition among flour manufacturers for retail markets. This results in prices that fall quite sharply relative to FSA prices.

### Some Caveats

Table 8-1 shows that FSA prices fall substantially below corresponding private sector prices in most cases. We should keep three cautions in mind.

First, representatives from the cooperating foodservice firm feel that their quoted prices are not the minimum that a client could receive from manufacturers. In particular, clients wishing to make significant volume commitments can sometimes obtain lower manufacturer prices, and manufacturers sometimes offer lower prices to certain classes of buyers, including government agencies. We did not seek out those sorts of prices because they are substantially more difficult to obtain, being quoted on a case-by-case basis. In addition, we compared cooperator prices with average FSA prices in a given month, not to the lowest obtainable FSA prices, and we compared with FSA auctions that did not entail long-lasting volume commitments (such as are currently done in FSA infant formula auctions). Therefore, we decided that the cooperator prices that we did have represented an appropriate basis for comparison.

The second caution is that we compared prices for commodity categories in which FSA currently does a significant amount of purchasing, and which therefore have passed a type of market test. That is, clients who choose to purchase these products through FSA presumably do so because they find that FSA can obtain these products at substantial discounts compared with what the clients can do for themselves. Our comparisons, therefore, have focused on those products where FSA's buying advantages may be the greatest, and one should be cautious about extending these results to products that are not currently purchased by FSA.

Finally, we remind readers that FSA and prime vendor systems are designed to do different things. FSA's food procurement strategies are designed to obtain large quantities of a few basic food products, and to obtain them at the lowest possible manufacturers' prices, subject to USDA product specifications. Foodservice firms are in the business of delivering a wide variety of food products to clients on a timely basis; in other words,

**Table 8-1: Comparing FSA prices with comparable private sector prices**

Product and location	FSA price divided by private sector price	
	April 1996	September 1996
Liquid shortening:		
Texas	0.734	0.683
IL/IN/WI	0.733	0.685
New England	0.737	0.685
Vegetable oil:		
California	n.r.	0.585
Texas	0.712	0.683
IL/IN/WI	0.764	0.718
New England	0.670	0.552
All-purpose flour:		
California	0.932	0.867
Texas	0.685	0.867
IL/IN/WI	0.689	0.826
Bread flour:		
IL/IN/WI	0.793	0.965
Pasta—nationwide:		
Spaghetti	n.r.	0.629
Macaroni	n.r.	0.621
Rotini	n.r.	0.622
Peanut butter:		
Nationwide	n.r.	0.824

Note: "n.r." means that no cooperator price was reported for that month.

they target several goals other than price. Depending on their goals, clients may rationally decide to purchase through a foodservice wholesaler, even if an FSA auction strategy can obtain lower manufacturer prices, because of the additional services provided by the foodservice wholesaler.

### Comparing Price Trends in FSA Commodities

In the previous section, we compared price levels of products purchased under FSA and private sector procurement strategies. ERS was also asked to investigate trends in FSA prices to see if those trends matched price trends for private sector purchases of the products that FSA buys. This is a much more difficult and uncertain task because we do not have access to comparable prices for specifically defined products going back in time. To perform that comparison, we obtained Producer Price Index (PPI) data from the Bureau of Labor Statistics (BLS). The PPI aims to measure changes in net prices received by manufacturers for precisely defined products. BLS produces PPI indexes that closely match four FSA commodities—all-purpose flour, baker’s flour, pasta, and vegetable oil. BLS does not produce a PPI for peanut butter, but does produce one for peanuts.

FSA buys a variety of different specific package types and product types within the broad commodity categories, and obtains bid prices for delivery to particular locations across the country. Systematic changes in locations, product characteristics, and container sizes could affect average FSA prices over time, even if there were no changes in bid prices for delivery of precisely defined products to precisely defined locations. To control for the possible effects of location, product type, and container size, we ran regressions with those variables in them: separate year effects then captured FSA price trends. Results are summarized in table 8-2. Price increases for FSA products were close to 1992-96 PPI changes for two products, bakery flour and vegetable oil, but substantially exceeded PPI growth in pasta and peanut butter. In each of the latter two cases, FSA prices rose about 4.5 percent per year faster than the corresponding PPI. In the fifth category, all-purpose flour, FSA prices rose modestly faster than the PPI.

We performed a second comparison using A.C. Nielsen data on average supermarket prices. The Nielsen data are derived from electronic scanners at supermarkets,

and measure changes in what consumers pay at retail for items, rather than what manufacturers receive. The scanner data provide measures of the average price per ounce for all-purpose flour or all peanut butter sold in U.S. supermarkets; since the data cover the period 1989-96, they overlap with the FSA data. The supermarket product definitions match up well with FSA definitions (for example, peanut butter is captured), and may represent an important source of price comparison for FSA clients, such as school lunch purchase agents.

FSA prices grew sharply faster than supermarket prices in all four comparison categories. The differences are again quite striking for pasta, where supermarket prices rose very slightly in line with the PPI, and also in all-purpose flour and in peanut butter, where the supermarket measure captures a more appropriate price comparison than the PPI does.

We made one further decomposition of the retail price data, by looking separately at price trends for private-label products. Those are products that are made by processors at the direction of a supermarket chain or a wholesaler that supplies supermarkets, and that carry the chain or wholesaler label. In that sense, they are similar to FSA products, which are also made by processors to USDA specifications and for a USDA label. Private-label price trends are below trends for FSA products (table 8-2), but are relatively close, except for pasta.

**Table 8-2: Comparing price trends in FSA auctions with related price indexes**

Commodity	Producer price index	Average supermarket prices	Private-label prices	FSA prices (low bids)
<i>Percent increase in prices, 1992-96</i>				
All-purpose flour	24.6	17.9	22.2	32.6
Bakery flour	26.2	—	—	22.3
Pasta	7.8	8.1	9.9	25.3
Vegetable oil	20.4	11.7	15.0	18.2
Peanut butter	-14.4	-7.7	3.1	4.4

Notes: FSA price trends are derived from the coefficients on year terms in regression analyses of low bids that also included product characteristics, fixed monthly effects (for seasonality), and fixed State effects. The Producer Price Indexes measure 1992-96 changes in annual averages for the most closely related products, while average and private-label supermarket prices reflect December 1992 to December 1996 changes in the weighted average price per ounce of closely related supermarket categories. The measures are based on supermarket scanner data, and the weights are sales weights assigned to each item in a category.

There is one strong explanation for more rapidly rising FSA prices. Agricultural commodity prices generally rose sharply during 1992-96. For example, prices for durum wheat, the major pasta ingredient, were 75 percent higher in the spring of 1996 than in 1992. Prices fell by the fall of 1996, but were still 40 percent higher than they had been 4 years before. By mid- to late 1996, prices for the hard and soft wheats used in flour averaged 30 percent above their levels 4 years earlier, in 1992.

Millers pay the same prices for wheat, whether they are producing for FSA purchases or for private sector purchases. Could agricultural price increases nevertheless have stronger effects on FSA prices? Yes, if wheat accounts for a greater share of the costs of manufacturing FSA products. If FSA prices are lower (and they appear to be) and if FSA products use the same amounts of wheat as private sector products (also true), then wheat costs will be a larger share of the total costs of producing FSA products than others. Increases in wheat prices ought to lead to greater percentage increases in FSA product prices than in average manufacturer or retail prices for the corresponding products. Retail prices also include the costs of providing retail services, which means that ingredient costs will have a still smaller percentage impact on retail prices than on FSA prices. By the same reasoning, FSA prices ought to fall more sharply when wheat prices are falling than average manufacturer and retail prices. In short, FSA prices should be noticeably more sensitive to input costs, both temporally in response to fluctuations in agricultural prices and spatially in response to differences in transport costs. The data in table 8-2 are consistent with that interpretation; we could have more

confidence in it if we could also compare FSA price trends with manufacturer and retail price indexes during periods of agricultural price declines.

## Conclusion

FSA appears to be able to obtain substantial price savings on the five commodities that we investigated, with 30-40 percent gains being common. We caution, however, that the comparison is at present based on a limited sample of commodities and on comparison to prices quoted by manufacturers to one large foodservice wholesaler.

Because FSA prices appear to be more sensitive than private sector prices to geographic location and to movements in underlying agricultural commodity prices, the FSA price advantage will also vary temporally and geographically. FSA prices will be lowest, relative to comparable private sector prices, near production centers and during periods of low agricultural commodity prices. Moreover, FSA's advantage is likely to be greater on common package sizes and product types, where the agency can induce greater competition in auctions.

Recent price trends suggest that FSA prices for pasta and peanut butter products have risen sharply compared with average manufacturer prices. In the case of pasta, FSA prices still appear to be far below private sector prices; however, FSA peanut butter prices are moving closer to private sector levels. When combined with perceived quality problems, many clients may not view FSA peanut butter as an attractive purchase.

# CHAPTER 9

## CONCLUSIONS

USDA's Farm Service Agency operates a system designed to elicit low bids for the delivery of large volumes of a limited number of food products. The system largely reaches those goals. The evidence in chapter 8 shows that FSA prices are substantially below those obtained by private sector buyers; chapter 7 supports those findings by showing that agricultural commodity purchase costs represent high shares of the prices for FSA food product purchases, suggesting that processing margins are quite low. By implication, FSA stretches USDA budget dollars by purchasing substantial volumes of food products for any given budget allocation.

As the experience of DoD and the VA show, low prices are only one of the things that ultimate consumers want from their food distribution system. Along with nutritional needs, they are also interested in timely delivery and product variety. FSA does not act as a full-line food distributor for its clients, and hence, does not focus on wide variety and rapid delivery. Rather, it fills a niche by providing the opportunity for clients to obtain large volumes of a few items at very favorable prices, and it fills that niche by limiting product variety and by responding more slowly to orders than a full-line distributor would. By saving clients money on USDA products, FSA can allow them to more effectively spend the rest of their budgets on a variety of products.

Nevertheless, FSA's actions can affect clients' realization of their several goals. Because of FSA's long lead times for delivery, client agencies must plan meals well in advance. When FSA deliveries arrive later than expected, meal plans are upset, meal quality can suffer,

and client agency costs can rise sharply when they must replace FSA's orders quickly. Moreover, USDA's product offerings, sometimes devised with a view toward surplus removal, do not always match client needs or expectations from USDA's niche service. As a result, even though FSA's strengths lie in the provision of large volumes of a relatively few low-priced items, reliable delivery and product variety still matter to clients, and the agency must be concerned with meeting client expectations of FSA in those areas.

### **The Role of Agricultural Prices**

FSA bids are quite sensitive to movements in agricultural prices—far more sensitive to agricultural price movements than are general wholesale and retail food prices. There is an important implication of that finding: because agricultural prices tend to fluctuate widely, FSA's prices will fluctuate more widely over time than corresponding wholesale and retail prices. FSA prices will fall more than wholesale and retail prices when agricultural prices decline, and they will rise more rapidly than wholesale and retail prices when agricultural prices rise sharply. The gap between FSA and corresponding retail and wholesale prices, therefore, should be largest during periods of relatively low agricultural prices and smallest during periods of high agricultural prices. Because our data also suggest that FSA prices may be more sensitive to transport costs, the gap between FSA and corresponding retail and wholesale prices should also be highest in those regions that are close to agricultural production regions.

Chapter 6 shows that bids for FSA products rose along with agricultural prices in the later part of our study period, and that bids rose relative to FSA's constructed prices. That pattern suggests a possible problem in KCCO's calculation of constructed prices: in particular, because constructed prices seem less sensitive to underlying agricultural prices than bid prices are, constructed prices may not give enough weight to agricultural prices. The issue is important because KCCO uses its constructed prices to decide whether to cancel an auction, and shift orders to later auctions. While, the threat of cancellation can be useful (auction theory suggests that the threat can lead to more competitive bidding, and the threat of cancellation is credible only if it is used at times), but actual cancellations lead to lags in product deliveries, thereby imposing substantial costs on clients. FSA needs to guard against cancellation of auctions when constructed prices are unreliable guides. We therefore recommend that FSA review its procedures for calculating constructed prices, with a particular focus on the weight given to agricultural prices.

## Competition

Competition matters, but it matters a lot only in some circumstances. Our statistical analysis of bidding shows that more bidders are consistently associated with lower prices on FSA products, but the effect of more bidders becomes rather small once an auction has two and three bidders. Most of the gains for FSA from competition come from adding a bidder in auctions where there would otherwise be only one bidder. As an approximate rule of thumb, FSA can do as much for its clients by finding a second bidder for a monopoly auction (reducing prices by 4-7 percent) as by finding four more bidders for an auction that already has two. Consequently, FSA should be most concerned about competition in those auctions that consistently attract a very small number of bidders. We recommend that FSA focus its efforts to add bidders for auctions that typically attract only one or two bidders.

Chapter 6 shows that the number of bidders in FSA auctions varies substantially by product and over time. Where are the most serious competitive problems? Seasonality is important for some products: for example, over three-quarters of monopoly auctions in flour occur in the fall, when mills operate near peak capacity. Monopoly auctions are also more likely among products with limited FSA volume—unusual package sizes and product characteristics.

In those cases, FSA can counteract monopoly by conveying accurate price information to clients—for example, that FSA's price advantages over commercial flour providers are weakest in the fall and strongest in other periods, or that FSA's price advantages are strongest in high-volume products. We recommend that FSA explore ways to counteract seasonal variations in monopoly by extending the experiment with rolling contracts, currently in use with cheese, to other products. At present, funding authorizations can constrain FSA's ability to use rolling auctions because money appropriated in one fiscal year must usually be spent in that year.

Participation in FSA bidding has a distinctive “all or nothing” character to it; bidders typically commit to being active in FSA auctions, in which case they bid actively each month on auctions for a variety of locations and products. Auction participation then does not typically decline because bidders reduce the number of auctions they are active in; rather, firms decide to get out of FSA bidding entirely. Our present research has not tried to uncover the reasons that firms decide to enter or leave FSA's bidding process, but the data we have developed do allow us to identify the firms that have entered and left the process during the period. Efforts to increase competition should inquire into the reasons for entry and exit by those firms, and the research should generate strategies to attract participation by more firms.

## Effects of Purchase Volumes

Monthly FSA purchase volumes have dropped substantially as a result of changes in USDA commodity support programs. But declining volumes have not as yet had any substantive effects on FSA bids. Purchase volumes have only small direct effects on prices, and those effects are not always in the same direction. Moreover, changes in purchase volumes for individual products appear to have had little effect on competition (typically, bidder numbers fell and then rose during the period, while volumes fell consistently and sharply).

Monthly volumes have small effects on bids, and the direction of the effect varies with volume; increases in volume are first associated with declining prices, but then drive prices up slightly in very high-volume months. The data also show that markets respond to total USDA purchases (foreign and domestic), and not simply to domestic buys. The most important effects on prices occur in months in which there are large PL480

purchases; in those months, coincident large domestic purchases can lead to FSA price increases of 2-4 percent. The driving factor in these instances are PL480 purchases, which vary sharply from month to month. We recommend that FSA initiate strategies to get better prices on domestic flour and vegetable oil, either by smoothing PL480 purchases or by timing domestic purchases to avoid peaks in PL480 purchases.

Order volumes (the amount going to a specific destination in a specific order) have very small effects on prices. Larger orders generally draw more aggressive bidding, but prices only fall by less than 1 percent; combining orders into multiple truckloads yields very limited savings. Major gains in price likely come as one goes to truckload volumes from smaller orders, and FSA already acts to combine small orders into orders of at least truckload sizes.

We also recommend that FSA advise client agencies that they can generally save 1-2 percent on purchase prices if they are willing to accept delivery to major destination points within a State, rather than to locations that are rarely used for FSA deliveries.

### **Commercial Labels and USDA Inspection**

The reliance on USDA labels and packaging shifts some risks of poor product quality away from the vendor and toward USDA, and consequently creates a need for USDA inspection. USDA inspection, along with occasional unusual packaging requirements, can raise vendor costs by 1-2 percent; USDA inspection and testing can also occasionally lead to lags in product delivery, which clients cite as a persistent problem. Some vendors, especially relatively small plants, cite inspection and packaging requirements as deterrents to participation in FSA auctions because of the effects on cost and on timely delivery of products.

The current system results in very competitive prices, and the insistence on USDA labels may contribute to the competition that leads to those prices; some firms may not wish to bid aggressively on their own branded products. In some products, in other words, the net effect of USDA labels and inspection may be lower prices. But insistence on USDA labels may, in other products, limit opportunities to obtain surplus stocks of commercially labeled products and may deter additional bidders from participating.

FSA currently purchases commercially labeled products in a few commodity categories. In highly oligopolistic markets with only a few vendors, FSA may be able to obtain more product variety and greater competition by opening auctions to commercially labeled products. The clear examples include the current experiments in ready-to-eat cereal and infant formula. Those two cases illustrate a dilemma for the agency. A principal argument for USDA labels is that they limit brand loyalty on the part of consumers and, therefore, allow for more competitive bidding, but brand loyalty is important in those two products (especially ready-to-eat cereal).

FSA's shift to purchase of commercial labels reflects the agency's judgment that the shift may introduce greater competition into two highly concentrated markets. But FSA also purchases products for other markets in which brand loyalty is far less important because the brands are never seen by ultimate consumers and because the products are used as ingredients in final servings, not as the serving itself. We recommend that FSA carefully evaluate its current experiments and consider a gradual expansion of commercial labels (especially including high-quality private-label and wholesalers' own-brand products), especially in products with limited existing brand loyalty and low vendor participation.

### **Service Quality**

Client agencies cited four common complaints. The primary complaint, referred to earlier, related to unreliable delivery of products. This complaint has three major components: lags due to USDA inspection delays (typically at small plants), cancellation of auctions, and vendor noncompliance. FSA can improve reliability by reviewing procedures for cancellation and inspection (including labeling requirements), and by instituting a more effective system of contractual penalties for noncompliance.

A second common complaint referred to product selection: client agencies feel that surplus removal goals drive the selection and distribution of bonus commodities that clients frequently have little interest in. Third, complaints sometimes referred to deterioration of some products. Finally, and related to the first three, clients cited barriers to problem resolution.

USDA products follow a long distribution chain between ordering food and serving a meal: a client

places an order with USDA, which then arranges for production. A vendor manufactures the product, and arranges for delivery from the processing plant to a State warehouse or to another processing site. The product is then delivered to the client's central facilities before being distributed to dining facilities, where further preparation and holding may occur before serving. The client may interact with State government agencies in ordering and final delivery, and may be unaware that up to five different USDA agencies may be involved in their order for food.

FNS is developing a hotline system in an attempt to respond better to immediate client problems with agency deliveries. Larger issues, relating to program goals and design, are likely to arise in response to ongoing changes to Federal farm and food assistance policies.

## **Retention and Use of FSA Auction Data**

FSA disposes of the electronic records of auctions after 1 year. The research for this report relied primarily on paper reports, the data from which were re-entered into an electronic format. Electronic data retention grows easier and cheaper every year, and so do methods for analyzing data. Moreover, because of steady improvements in the electronic retention and analysis of data, undergraduate business and economics majors now routinely learn almost all the techniques that were used in this analysis, and high school students are being introduced to techniques of graphing and summarizing statistical data. In short, KCCO commodity analysts should, in the future, be able to easily call up 5 years' worth of past auction data (for example); they should be able quickly to summarize key data patterns, and can easily be provided with expert summaries of more subtle issues. They should be able to use that information in making auction decisions and in delivering timely information and advice to client agencies. We recommend that KCCO's future strategy for information technology include steps to retain electronic auction records and to develop those records into easily accessible databases.

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# APPENDIX A

## GLOSSARY OF ACRONYMS

AID — Agency for International Development, State Department

AMS — Agricultural Marketing Service, USDA

BLS — Bureau of Labor Statistics, Department of Labor

CCC — Commodity Credit Corporation, FNS/USDA

CSFP — Commodity Supplemental Food Program, FNS/USDA

DLA — Defense Logistics Agency, DoD

DoD — Department of Defense

DPSC — Defense Personnel Support Center, DLA/DoD

ERS — Economic Research Service, USDA

FAS — Foreign Agricultural Service, USDA

FNS — Food and Nutrition Service, USDA

FDIR — Food Distribution Program on Indian Reservations, FNS/USDA

FSA — Farm Service Agency, USDA

GIPSA — Grain Inspection, Packers and Stockyards Administration, USDA

KCCO — Kansas City Commodity Office, FSA/USDA

NSLP — National School Lunch Program, FNS/USDA

OAMM — Office of Acquisition and Materials Management, VA

TEFAP — The Emergency Food Assistance Program, FNS/USDA

USDA — United States Department of Agriculture

VA — Department of Veterans Affairs

# APPENDIX B

## DETAILED REGRESSION RESULTS—ANALYSIS OF BID PRICES

**Table B-1: Regression analysis of low bids in USDA all-purpose flour auctions**

Variable	Coefficient	t-statistic
<b>Wheat price variables</b>		
Cash price, bid month	0.7874	96.34
Month ahead change	.1637	9.78
Month behind change	-.7697	38.65
<b>Product characteristics</b>		
10 lb. bag (Base is 5)	-.0180	6.02
50 lb. bag	-.0469	14.26
100 lb. bag	-.0581	3.72
Bleached	.0190	2.67
<b>Auction characteristics</b>		
Truckloads in order	.0006	0.57
Monthly volume, FSA flour	-.6445	14.93
Monthly volume, PL480	-.3412	14.77
(FSA volume) <sup>2</sup>	.0094	6.82
(PL480) <sup>2</sup>	.0003	4.10
FSA volume*PL480	.0212	14.40
Total orders at location	.0001	0.09
One bidder (base is three)	.0815	20.76
Two bidders	.0123	4.38
Four bidders	-.0163	6.14
Five bidders	-.0248	7.94
Six bidders	-.0178	4.54
Seven or more bidders	-.0266	5.49
<b>Bid month</b>		
February (January is base)	-.0179	4.14
March	.0456	10.19
April	.0254	4.92
May	.0390	7.68
June	.0907	13.73
July	.0184	3.94
August	-.0011	0.25
September	.0589	12.97
October	.0372	6.22
November	.0542	10.99
December	.0235	5.08
<b>Summary statistics</b>		
Number of observations	5,726	
R <sup>2</sup>	.80	
Dependent variable mean	2.6183	
Root mean square error	.0636	

Notes: Dependent variable is natural logarithm of winning bid price. Wheat prices, the number of orders at a location, and monthly volume are also expressed in natural logarithms, and truckloads variable takes on values from 1 to 5. All other variables are dichotomous, taking values of zero or one. Model also includes 48 separate State effects. Data consists of shipments to contiguous 48 States.

**Table B-2: Regression analysis of low bids in USDA bakery flour auctions**

Variable	Coefficient	t-statistic
<b>Wheat price variables</b>		
Cash price, bid month	.7019	47.90
Month ahead change	.1862	5.15
Month behind change	-.7622	21.81
<b>Product characteristics</b>		
50-lb. bag (base is bulk)	.1204	14.54
100-lb. bag	.0970	18.20
Bleached	-.0117	2.71
Hrth	.0763	14.44
<b>Auction characteristics</b>		
Quantity in order	-.0049	1.43
Monthly volume of FSA flour	.1619	3.01
Monthly volume, PL480 flour	.0574	2.92
(FSA flour volume) <sup>2</sup>	-.0046	2.66
(PL480 flour volume) <sup>2</sup>	-.0011	6.91
FSA volume*PL480 volume	-.0025	1.78
Total orders at location	-.0084	3.68
Transport mode not truck	.0118	2.17
One bidder (base is three)	.0789	14.87
Two bidders	.0221	4.83
Four bidders	-.0083	1.12
Five bidders	-.0039	0.36
<b>Bid month</b>		
February (January is base)	-.0030	1.12
March	-.0023	0.30
April	-.0215	2.79
May	-.0447	5.32
June	-.0155	1.70
July	-.0619	4.29
August	-.0141	0.92
September	.0662	7.81
October	-.0371	3.68
November	-.0220	1.90
December	-.0199	2.00
<b>Summary statistics</b>		
Number of observations		1,711
R <sup>2</sup>		.82
Dependent variable mean		2.599
Root mean square error		.0643

Notes: Dependent variable is natural logarithm of winning bid price. Wheat prices, the number of orders at a location, and monthly volume are also expressed in natural logarithms, and truckloads variable takes on values from 1 to 5. All other variables are dichotomous, taking values of zero or one. Model also includes 48 separate State effects.

**Table B-3: Regression analysis of low bids in USDA pasta auctions**

Variable	Coefficient	t-statistic
<b>Wheat price variables</b>		
Durum cash price, bid month	.3351	55.63
Month ahead change	.0071	0.40
Month behind change	-.3099	16.59
<b>Product characteristics</b>		
Spaghetti 2 lb. (base is 20 lb. spaghetti)	.0393	9.90
Macaroni, 20 lb.	.0136	4.88
Macaroni, 1 lb.	.0925	26.90
Rotini, 20 lb.	.0780	23.75
<b>Auction characteristics</b>		
Truckloads in order	-.0098	2.31
Monthly volume, FSA pasta	-.0681	17.90
Total orders at location	-.0024	2.09
Small business bidder	.0178	7.23
One bidder (base is 3)	.0620	19.70
Two bidders	.0237	9.08
Four bidders	-.0168	5.05
Five or more bidders	-.0419	5.55
<b>Bid month</b>		
February (January is base)	.0107	2.08
March	-.0192	3.56
April	-.0079	1.38
May	-.0027	0.46
June	-.0305	5.14
July	.0248	4.60
August	.0219	3.98
September	.0532	9.60
October	-.0150	2.67
November	.0306	5.41
December	-.0119	2.16
<b>Summary statistics</b>		
Number of observations		4,487
R2		.764
Dependent variable mean		3.3333
Root mean square error		0.0649

Notes: Dependent variable is natural logarithm of winning bid price. Wheat prices, the number of orders at a location, and monthly volume are also expressed in natural logarithms, and truckloads variable takes on values from 1 to 5. All other variables are dichotomous, taking values of zero or one. Model also includes 48 separate State effects.

**Table B-4: Regression analysis of low bids in USDA vegetable oil auctions**

Variable	Coefficient	t-statistic
<b>Agricultural price variables</b>		
Soybean oil cash price, bid month	.4869	73.98
Month ahead change	.1313	14.58
Month behind change	-.1848	21.90
Cottonseed oil cash price, bid month	.3673	64.30
Month ahead change	.1810	17.13
Month behind change	-.2305	20.50
<b>Product characteristics</b>		
Vegetable oil, 48 oz. (1 gal. is base)	.2967	65.64
Vegetable oil, bulk	-.2479	104.02
Shortening, 3 lb.	.1818	123.27
Shortening, 50 lb.	-.0214	6.80
Shortening, 1 gal	.0474	25.98
<b>Auction characteristics</b>		
Truckloads in order	-.0048	3.18
Total orders at location	-.0002	0.28
Monthly volume, FSA	-.1569	3.27
volume squared	.0113	8.71
Monthly volume, PL480	-.2617	5.32
volume squared	.0125	10.53
PL480 volume * FSA volume	-.0103	4.91
Small business winner	-.0131	8.47
One bidder (base is 3)	.0554	25.76
Two bidders	.0085	6.32
Four bidders	-.0132	5.80
Five or more bidders	-.0226	5.77
<b>Month</b>		
February (January is base)	.0014	0.41
March	-.0460	13.50
April	-.0102	2.88
May	-.0364	9.07
June	-.0366	10.40
July	-.0426	12.70
August	-.0447	13.13
September	-.0664	20.36
October	-.0593	18.53
November	-.0435	14.12
December	-.0264	8.05
<b>Summary statistics</b>		
Number of observations		7,152
R2		.940
Dependent variable mean		-.9808
Root mean square error		.0423

Notes: Dependent variable is natural logarithm of winning bid price. Oil prices, the number of orders at a location, and volumes are in natural logarithms, and truckloads variable takes on values from 1 to 5. All other variables are dichotomous. Model also includes 48 separate State effects.

**Table B-5: Regression analysis of low bids in USDA peanut butter auctions**

Variable	Coefficient	t-statistic
<b>Peanut price variables</b>		
Peanut cash price, bid month	0.5350	28.29
February adjustment	-0.6321	7.72
March adjustment	-0.4562	5.24
April adjustment	-0.6337	6.87
May adjustment	-1.0036	10.86
June adjustment	-1.5615	16.02
July adjustment	-2.1790	24.03
<b>Product characteristics</b>		
No. 10 can (base is 2 lb.)	-0.0136	7.98
Reduced fat, No. 10 can	0.3384	16.78
<b>Auction characteristics</b>		
Truckloads in order	-0.0004	0.18
Monthly volume, FSA peanut butter	0.0490	27.54
Total orders at location	-0.0032	3.72
Small business winner	-0.0095	5.31
Two bidders (base is 4)	-0.0254	1.53
Three bidders	0.0107	2.53
Five bidders	-0.0101	4.47
Six or more bidders	-0.0404	15.35
<b>Month</b>		
February (January is base)	-0.7679	7.64
March	-0.5517	5.18
April	-0.7720	6.85
May	-1.2288	10.87
June	-1.906	15.96
July	-2.6660	23.94
August	-0.0172	4.40
September	-0.0078	1.96
October	0.0294	6.39
November	0.0447	10.42
December	0.0560	12.60
<b>Summary statistics</b>		
Number of observations		5,242
R <sup>2</sup>		.544
Dependent variable mean		-0.2446
Root mean square error		0.0532

Notes: Dependent variable is natural logarithm of winning bid price. Peanut prices, the number of orders at a location, and volumes are in natural logarithms, and truckloads variable takes on values from 1 to 5. All other variables are dichotomous. Model also includes 48 separate State effects.

Because peanut prices only are available for marketing year months, model includes last quoted monthly price of marketing year for off-season prices, and then allows the coefficient on that price to vary with the off-season month (the adjustor variables).

